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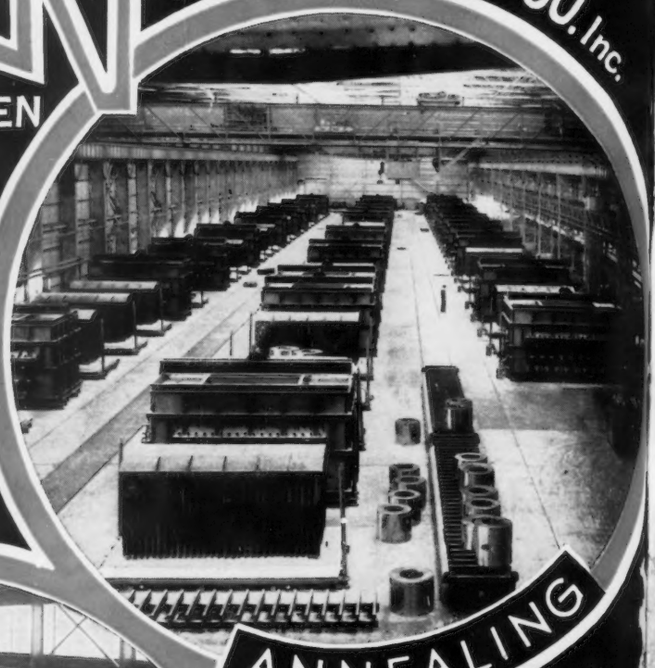

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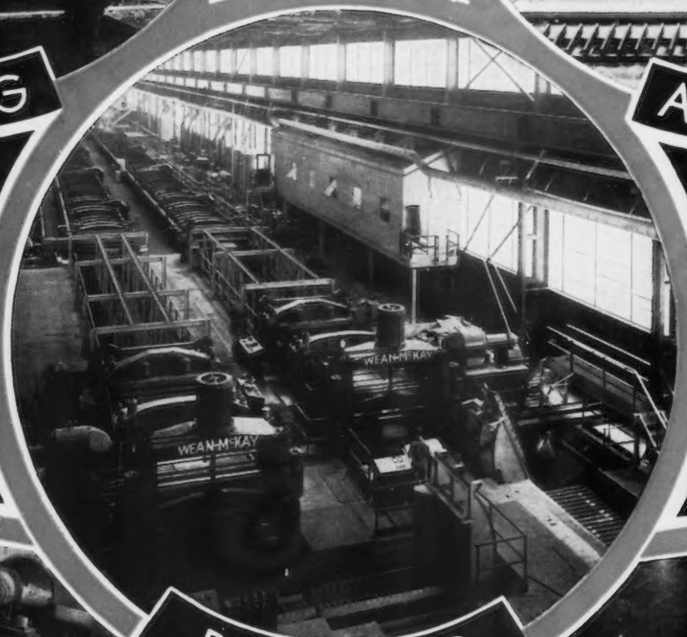

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This Week in The Iron Age

JUNE 5, 1941

VOL. 147, NO. 23

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The Iron Age

JUNE 5, 1941

ESTABLISHED 1855

America Challenges Its Engineers

THE productivity of a country is primarily measured by the ability of its engineers. And particularly is this true as to producing the tools of war.

Hitler, by his challenge to democracy, has caused a great challenge in turn to be issued to the engineers of America. Our President and his administrators have called for production accomplishments that stagger the imagination. In one item alone, aircraft, it will be necessary for us to build up producing capacity during the next 18 months to twice that of the automobile industry, the greatest yet known.

A tremendous task. But it will be done. It will be done because there is no ceiling yet established for accomplishment by our American engineers. And there never will be.

Let's consider, for a moment, how the American engineer has met the challenge of the past.

He has transformed the prehistoric ox sled into the motor car by combining the wheel with the engine, thereby giving mobility to multitudes. He has graduated mankind from the stone age to the steel age through his aptitude in metallurgy. He has freed our earthbound feet and given us the wings of angels through the production of the airplane. He has raised the standards of living of great populations and multiplied the power of possession a thousandfold through his development of mass production.

And unfortunately, he has made it possible for men like Hitler to carry death and destruction to innocent men, women and children.

It is not his fault, however, that the fruit of his mind has been used for the purpose of distilling the poison of destruction. And now he is challenged to counteract that poison and overcome it through the working of new industrial miracles.

I know the American engineer well enough to know that he will work that miracle. He already has made a better start upon it than the people know.

And I know the American engineer well enough to refuse to accept a defeatist attitude about the future, when the appetite of Mars has been satiated. I am confident that then the principal healing of the wounds of a war torn world will be done by him. For he can give more to the "have-nots" of this earth, through his ability to produce what they need than can our physicians or statesmen or perhaps even our clergymen.

The American engineer accepts, willingly, the challenge of today and looks hopefully to accepting that of tomorrow.

J. H. Van Deventer

From Sand Dunes to Millions of Tons of Steel

Inland Steel Company now produces millions of tons of steel, where less than 40 years ago a single railway tower house stood in a wilderness of sand dunes and scrub oak trees.

The turn of this century found Inland operating its rail steel mill at Chicago Heights. At that time the Middle West was beginning to show signs of phenomenal growth. Those with vision foresaw that it was destined to grow and continue to grow into an ever more important market.

Inland saw the growing need for steel in this area of expanding industry, and in 1901 began building its Indiana Harbor Plant on the sand dune shores of Lake Michigan. Commending this location were its easy access to vast stores of the finest raw materials, and its central location from which to reach the great Middle Western market.

In the first year of operation, Inland made less than a quarter of a million tons of steel. By 1906, output had been doubled. Ore, limestone and coal properties, and lake freighters, were soon acquired, to give Inland full control over all materials and steelmaking operations.

In 1916, Inland made enormous increases in its capacity. It not only prepared to produce 1,000,000 tons of steel per year, but it acquired adjacent property and built new furnaces and mills for rolling a wider range of products. The year 1932 saw the opening of Inland's first continuous sheet and strip mill. In the following year tin mills were installed. In 1938, Inland added more open hearth furnaces and built a second continuous mill.

Today, output is at the capacity rate of 3,300,000 tons of ingots per year. Not only has Inland added to its facilities, but also has recently rebuilt and modernized entire departments. Now, with one of the most modern steel plants in the world, Inland is able to do its full share in the present national emergency.

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50,000 AIRPLANES

By J. H. VAN DEVENTER
President and Editor, The Iron Age

WHAT does this production objective mean in terms of manufacturing technique, absorption of labor and raw materials? Herein these factors are correlated into a dramatic perspective, a perspective first set forth on May 19 in an address before the Detroit Section of the Society of Automotive Engineers.

IN most big cities today the rights of sidewalk superintendents have become recognized and established. Contractors have bored holes at convenient heights in the board fences surrounding new construction projects so that sidewalk superintendents may glue their eyes to these holes and proceed to observe and criticize the way in which the work is being done.

A sidewalk superintendent and an editor differ only in that the latter puts down on paper an account of what he sees, and makes peeking through knot holes a vocation instead of an avocation.

For 30 years the writer has peered through many industrial knot holes and has been privileged to set forth and interpret many interesting and significant happenings in the great metal industry. The automobile industry has been seen to advance steadily from very modest beginnings to its amazing present giant stature. This industry has virtually taken America upon its shoulders and lifted it to new and unparalleled heights of endeavor and accomplishment.

Now the automobile industry is in the aircraft business. The automobile industry does not want to be in the aircraft business—it would have preferred to continue its normal function of satisfying the public demand of upwards of 5,000,000 cars yearly. Moreover, it is doubtless true that at first the airplane makers were not a bit enthusiastic about an invasion of their sphere of activity. They wondered what might happen to their business after the Detroit technicians had learned how to turn out airplanes.

But it has for some time been obvious that the size of the aircraft job laid down by the Army and the Navy makes it inevitable that automobile makers be drawn into the production job. Some Detroit producers are just now getting their feet wet, some are in up to their knees, and within a couple of months most of the companies in Detroit will be up to their necks in exerting all their well-known ingenuity to keep their heads above water.

So, such is the situation and there is no avoiding it. As to whether automobile makers will stay in aircraft production after the emergency, that is another question? However, it might be well to point out that the success of the American enterprise system is not based on the recognition of the seniority principle as applied to either industries or companies. It is based on the answer to the simple question, "How well is the job done?"

It is the writer's belief that very few people visualize just what this aircraft production program means in terms of raw materials, manufacturing technique and labor absorption. For that matter it is too big a job to see all at once, so it is more informative to travel around and look at it from different directions.

First, the quantitative viewpoint is most startling even though it perhaps is the least revealing of all viewpoints, for it is like trying to visualize the size of the Empire State building from an airplane cockpit three miles above it. As currently conceived the defense program contemplates a production rate of 30,000 units yearly by the middle of 1942 and 50,000 units yearly during 1944. To the general public, and perhaps to some automobile makers accustomed to a yearly output of 5,000,000 units, these production objectives appear simple indeed.

But, when the industry begins to come down to earth and gets the real perspective, these 30,000 or 50,000 units yearly are most startling in their implication.

The trouble is that both the public and frequently many people in industry have been inclined to deal with dissimilar units in the automobile and aircraft fields. It might be of interest to point out that the effort involved to produce one automobile unit (averaging all cars)

and one aireraft unit (averaging all planes) *will be*, roughly, 1 to 166, when the time comes that the industry is turning out 30,000 aircraft yearly. The present ratio on a much smaller schedule is considerably greater than 1 to 166.

Reduction in Production Time

It is a well-known characteristic of mass production on a standardized product that the ratio of effort per unit goes down as the quantity rises. Thus, it might be anticipated that when a production of 50,000 yearly is attained it might be possible to turn out one plane with the effort involved today in producing 100 cars. That may be so, and if so, it will be a dramatic accomplishment. Unfortunately, several factors will work against this pleasing objective.

First, there is no one person in the United States with the power to freeze military aircraft design. Albeit, many newspaper columnists profess to believe such action possible, the President cannot freeze a design, the Army and the Navy cannot do it, and Mr. Knudsen cannot do it. Only those extremely capable men working under Hitler can do it, and at the moment they show no inclination to do so. German designers have their wits constantly sharpened by the pressure of active war, and the severest of all tests—actual combat. Just recently the British have shot down some of these new designs and, by and large, the advances have not been too spectacular even though construction is still superb. The English on the whole, have shown admirable ingenuity in aircraft design and in necessarily setting up a shadow factory system, although their construction set-up is not quite the equal of that of the Germans. Here, in the U. S., aircraft design is approaching, and will probably surpass, that of the Germans, and production technique in the near future will very likely teach both the Germans and the English something new in the art of modern mass aircraft construction.

Of course, the many design changes that have recently cursed aircraft production in this country are not desirable. The Army and Navy don't change designs for just the hell of it, even though, perhaps, there have been too many changes over the past year. On good authority the writer recently heard of 143,000 design changes made in a certain plane in order to gain, among other advantages, three miles per hr. additional top speed. Some of the design changes were minor, of course, but any production man knows the havoc wrought in a production line by a minor change. But, 3 miles an hr. is of paramount importance to a pilot who has four machine guns and a cannon riding his tail—or vice versa.

Past wars have furnished much experience in small arms, and the result has been that after certain changes are made it is possible to practically freeze design and let the quantities roll through for the duration of a war. A similar situation applies in light and heavy artillery and the ammunition for these guns. No such action can be anticipated in aircraft unless the other fellow should suddenly stop learning, too. And, in a related field, that of the anti-aircraft gun, a similar situation obtains in which existing calibers and ranges are frequently unsatisfactory as the aircraft designer sends his craft to higher and higher levels of flight.

Essentially this job of producing airplanes in the U. S. means that the aircraft concerns have to gear their thinking to much larger lots in production than they have in the past been accustomed to; on the other hand, automobile makers going into aircraft production have to accustom themselves to handling much smaller lots than has been their habit. There is going to be a transplanting of ideas from the aircraft to the automobile industries, and vice versa, to permit the sending through of batches of airplanes, perhaps 500 at a time, on a production line. At least some of the efficiency available in automobile production will be represented in this batch production, then a design may be changed somewhat, and a new batch sent through.

Another important factor tending to prevent the reduction of the effort ratio between car and airplane will be the shift into heavier types of planes as the war progresses. A sizable proportion of output today is in trainers, light types of fighters and bombers. Today, the primary job is to teach Americans and Canadians to fly and at the same time to arm England and U. S. forces.

Tomorrow, England and the U. S. will both need a much larger proportion of heavy bomber output to carry the war into Germany and occupied territory. As the planes get bigger, the man-hours required in manufacture multiply rapidly.

Consider what is involved in the very important metal, aluminum, merely in stepping up the program to 500 heavy 4-motor bombers per month. One of these units, as for example, the B-17, weighs 22 tons. A program of 500 such planes per month, or 6000 per year, requires no less than an annual production and delivery of 66,000 tons of aluminum alloys—this consumption is the equivalent of one-sixth of the total estimated aluminum production of 1941. All this just for heavy bombers alone.

These heavy bombers, plus 24,000 other odd types of planes scheduled for production, will throw a load on the aluminum industry that could not be foreseen a year ago. And, a practically identical situation has applied to alloy steel of the high grade variety required for airplane motor construction.

But this is only the beginning. After the material is on the job there is the tremendous task of producing air-frames, motors, landing gear and other mechanical equipment, armament and instruments.

There are currently no accurate figures available concerning man-hours required for making a heavy bomber. However, the writer does know that one of the most efficient airplane companies requires today 50,000 man-hours to produce the air-frame of a medium 2-motor bomber—just the air frame alone, not the motors, landing gear, mechanical equipment, armament and instruments.

100,000 Man-Hr. for Airframe?

If it takes 50,000 man-hours for a medium two-motor bomber, what would a flying fortress type of bomber require as regards labor? A Detroit optimist, an optimist who has frequently seen his prophecies come true on the production line, is sufficiently confident of the abilities of the automobile industry that he believes a flying fortress will, in the not far distant future, be turned out at a man hour expenditure of considerably less than four times that required by a two-motor medium bomber. Taking his optimism into account, the writer estimates that 100,000 man-hours could be set up as a future figure for the very heavy four-motor bomber. This, if

anything, errs badly on the conservative side.

Equally conservative is the estimate of 4000 man-hours for each motor and propeller for this bomber. Four of such units account for 16,000 more man-hours, and, by the time the landing gear, mechanical accessories, armor and instruments are included, it would seem most conservative to estimate a total of 150,000 man-hours required to put a flying fortress type of bomber into the air ready to fight.

Just what does this 150,000 man-hours per plane mean? It means that just this *one part* of our air defense program sets up a requirement of 900,000,000 man-hours per year, which on a 40-hr. week basis calls for a labor force of 450,000 men. As a matter of fact, just the bomber programs now under way by Chrysler, Ford and General Motors call for 130,000 men for the initial stages in the Detroit areas.

This estimate by the writer might be called "wildly conservative." As a matter of fact, better authorities than the writer have quoted from "inside information" and not through knot-holes, that even before the heavy bomber program was stepped up, the industry would be absorbing the direct efforts of 800,000 workers by the end of next year.

It is a big business that is in process of development. A very big business—more than twice as large as the present business of making cars and trucks. It will be the biggest business of all times, anywhere on this earth, when based on the man-hours per unit and the number of units turned out. In Germany, perhaps 1,000,000 people are now employed in aircraft manufacture, or such has been one estimate made. However, Germany has developed no unique production technique in aircraft and will not likely do so over the remainder of the war; for the industry there is geared to a certain type of manufacture, just as it is in England, and just as it has been to some extent in this country. An Englishman could step into a German plant and feel entirely at home.

In Detroit, however, there is evolving a different method of production. It is not quite clear yet what actually will be the final result but it is believed by most of the automobile companies becoming involved in this effort, that the final technique will show many of the benefits of mass production but still retain sufficient flexibility to absorb the design changes that are and will be a distinctive feature in this new revolutionary instrument of war.

MODEL of 1500 hp. experimental airplane engine being developed at Ford Motor Co. under Charles E. Sorenson, Ford production chief. It is shown here being inspected by Maj. Gen. H. H. Arnold, left, deputy chief of staff, and other Army officers. Henry Ford, center, intends to put this V-type, 12 cylinder, liquid cooled design into production. It is supercharged with an exhaust driven, turbo supercharger.

o o o

The automobile industry might find it interesting to consider what these plans for aircraft manufacture mean, and could gain a very informative perspective by making comparisons with past accomplishments in the automobile industry. It took more than 30 years to build the automobile industry, the biggest single industry in the world. Men from the four corners of the earth came to see it and to marvel at the miracle of mass manufacturing. Now, the automobile industry is being asked to join the party and help build within a short 18 months an industry that will be twice as big.

In 1938 the aircraft industry in

the United States employed 36,000 workers. During that year, incidentally the best year it had to that date, a total of 1800 planes took the air. Using the ratio previously established of 1 to 166, this 1938 accomplishment in aircraft would be the equivalent of producing 298,800 cars and trucks—this would put the aircraft industry of 1938 in relatively the production position of the automobile industry of 1911.

So in 18 months the automobile industry will be a party to building an aircraft industry that will span twice the territory the autombile industry covered from 1911 to 1940.

With the magnitude of this job thus established, it is inconceivable that anyone can think it could be done without enlisting the services of the motor car industry, as well as the services of all other available industrial units, large or small, which have services that might be rendered either as primary or as subcontractors. Mr. Knudsen has known this but he has had to sell the idea; he has had to sell it to the government, to the Army and Navy, to the aircraft industry and to the automobile industry. As a production man, he has found it necessary to first become a salesman. Now that the bill of goods has been sold, the production job is in the foreground. Mr. Knudsen or someone else will have to have some additional teeth to chew into this project and certainly there should be no tampering with the few teeth already available.

Probably the machine tool industry has so far received the greatest impact of the aircraft program. In fact, the demands on the machine tool industry might serve to some extent to visualize from a different direction what is involved in aircraft manufacture. During the coming year, four out of every six machine tools made in this country will go into aircraft plants or plants making parts for them. The number of tools will be on the order of 44,000. Operating them on a two shift basis will require 132,000 machine tool operators, nearly all of whom will require training.

Hitler's Advantages

For years this country has bragged of its mechanical genius and mass production supremacy. Now, many people wonder why it is that we have to turn ourselves inside out and upside down to catch up with Hitler, a man who has no great reputation along these lines. The answer is simple indeed. In the Napoleonic Wars, it was said that God was on the side with the heaviest artillery. Hitler was smart enough, or at least he listened to men who were smart enough, to see that air control would be the dominant factor in modern warfare. That is, today God seems to be on the side with the most and the best aircraft.

The Germans have been pretty smart in realizing that one plane today is worth three planes next week or nine planes next month. Mr. Hitler hardly got out of his first audience with Mr. Hindenburg before he gave the German machine tool producers the go-ahead, over eight years ago. The English waited until less than two years ago and the U. S. waited until a year ago. It is just another case of the tortoise and the hare, and it is to be hoped that there are exceptions to the famous military axiom that the country with the smaller armament production at the start of a war never catches up. If this country had started two years ago to do what it is attempting today, there would not be nearly so much straining on the backstretch. As it is, the whole affair is likely to be a nip and tuck, because minutes and hours are the most valuable ammunition on earth and the kind that cannot be reloaded.

Hitler has one other advantage in the aircraft race in that he uses fewer designs and types of war planes. Not counting transport planes, Germany has some 25 makes and types of aircraft for war purposes. This country has 51. Any production expert knows what an advantage a 50 per cent reduction in variety gives to the shop man.

As a matter of fact, of the 25 available types and makes of German planes, 5 of them are doing most of the work in there where the going is hot. The writer is not a military expert and does not pro-

WITH no loss of time for loading, Vultee's new three-column hydraulic presses form aircraft parts faster than any other method now in use. Two operators keep the motorized rotary platforms automatically moving sheet metal blanks under the die.

fess to know whether it is better to depend upon 5 styles of planes or 50. Just from the standpoint of a sidewalk superintendent, however, it seems that Mr. Hitler is making out pretty well with his 5. One man in Germany has the say as to the number and types of planes to be used, as well as supreme authority over all design changes. That man is not Hitler. In planes, as in many other things, Hitler obviously derives great strength from his willingness to delegate authority to good men in their respective fields.

Hitler undoubtedly commands the services of some of the most able military strategists in the world and from the quality and quantity of his mechanical equipment, there obviously must be some very able production men with considerable authority in that country. The writer seriously doubts, however, whether they are the equal of Mr. Knudsen and his assistants in the OPM. Perhaps it may be that Hitler gives his production men more authority to act and make decisions, and not less, than they asserted in the private industries from which they came.

Then, too, Hitler has a couple of other advantages over this country. It is true that he lacks the advantages of social security, the 40-hr. week, the CIO and AFL, but on the other hand his coal mines do not stay shut for a month on somebody else's say-so, and when there are concrete bases to be poured in one of the tank plants they do not remain unpoured because of a truck-drivers' strike. If this country is to have an all-out defense effort, it must be all-out indeed, both for labor and capital. There must be some way to settle labor's legitimate grievances, and there must be some way to get labor over its idea that capital is going to make a fortune out of this national defense effort. It is extremely unfortunate that labor is generating so much public resentment that action might become imperative that might set its status back many years. But such is the temper of the times, that serious interferences with the flow of needed armaments may have extremely unhappy results.

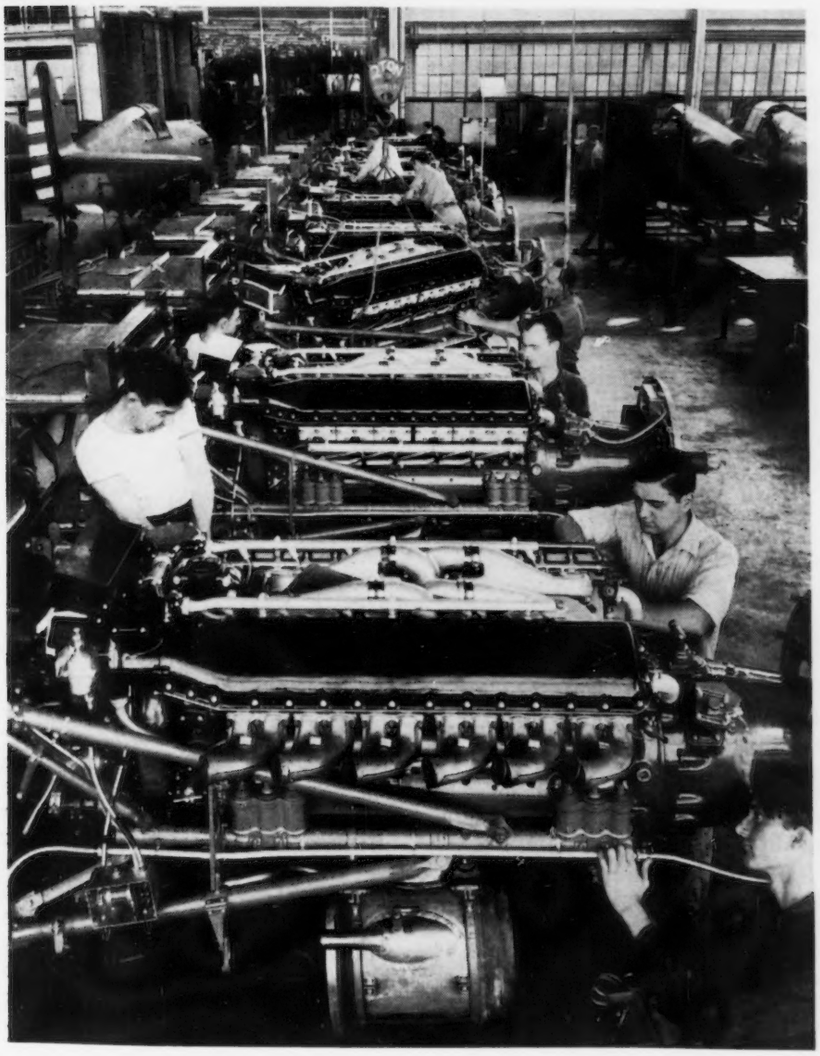
But enough of Mr. Hitler. It might be interesting to return to the automobile industry and its part in the aircraft program.

Many people seem to think that all the automobile industry has to do is to stop making cars, twist a few knobs, and adjust a couple of machines, and jump out of the way as the planes roll off the assembly line; and, it cannot be denied that some of the automobile makers contributed to this idea early in the days of the defense program. As a matter of fact, practically all that can be made in an automobile plant, and made successfully, are automobiles. It is possible to graft a pear tree upon an apple tree, but it would be quite discouraging to attempt to graft a Pratt & Whitney wasp onto a Ford V-8 production line; or a Rolls Royce on a Packard line. All this, irrespective of the famous joke in Germany, during that period when everybody was whooping up a German war with the Communists, about a German worker in a sewing machine factory who surreptitiously took home a new part every evening to put together a machine for his wife. However, no matter how he put them together, the result was always a machine gun.

Will it be possible for the automobile industry to buy aluminum strip in rolls, put it on a present line of a motor plant, and bang out wing or plane parts? On a recent trip to Detroit, the writer saw one of the new plane engine plants there. Another plant setup by one of the body builders was designed to make airframe parts of sheet aluminum. In the engine plant, about 60 per cent completed, there will be an initial employment of 20,000 workers. The building is new; every machine tool in the plant, and there are thousands of them, is new; the handling methods, conveyors and assembly line mechanism are devised for the specific purposes and are unlike those used in the adjoin-

(CONTINUED ON PAGE 114)

UNLOADING Allison engines at the Bell Aircraft plant. These engines were the first major contribution of the automobile industry to present-day aircraft production.



Bolts and Nuts

—Certain assembly characteristics and strength are desired in bolted structures, and herein are observations on threads that will enable many users to more intelligently lay down specifications in order to obtain these objectives. This is an abstract of an address before the American Institute of Bolt, Nut and Rivet Manufacturers.

ASTOUNDING is the volume production of interchangeable parts which can be tortuously mated by a curling wrinkle on their surfaces. This is no simple fitting of a round pin in a round hole. Accuracy of three diameters —pitch, major and minor—is necessary; angle of thread sides must be correct; spacing of threads must be right, not only over-all, but progressively from point to point along the spiraling hills and valleys, so that leading sections of threads will not be impeded by mismating of sections to follow. Fig. 1 illustrates these elements.

How may it be shown that thread dimensions are right? The most usual way is to check them with gages which are made to allow a prescribed tolerance. It is impracticable, however, to measure dimensions exactly, and the rejection or acceptance of a given product will depend to a considerable extent upon the method of gaging used. For this reason, it is important that the accepted way of gaging be known to both manufacturer and user.

Over-tightness of threads is avoided by fitting them to standard go gages. Go plug gages for nuts represent the largest bolt on which the nut is expected to go. Likewise, go ring gages for bolts represent the smallest nut into which the bolt is expected to go. Bolts and nuts that assemble with these standard go gages will go together without interference.

The user may want to know that bolts are not too small, nor nuts too large, to function properly. The obvious and sure method of showing this is to pull sample bolts and nuts to see that the bolt breaks before the threads strip. Approximate information, however, is obtained by a dimensional check with not-go gages, although it is difficult to gage minimum metal limits of any product, and the result must be translated into terms of useful qualities, such as strength.

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By W. C. STEWART

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Not-go plug and ring gages are similar to go gages but are larger in pitch diameter in the case of plugs and smaller in the case of rings. They have a short length of thread and it is recognized practice to permit them to assemble with the product a distance equal to the thread length of the gage without perceptible shake or play. The gages must jam with the product at some point and part of the thread crest is cut off to insure that jamming occurs along the working thread flank and not at the crest. This may be carried to the point that the crest width of ring gages is three-eighths of the thread pitch and the major diameter of plug gages is no greater than that of corresponding go gages. Furthermore, pitch diameter tolerance for manufacturing not-go inspection gages may be outside the product limits to insure that product will not be rejected which has already passed working gages in the process of manufacture.

Several standard tables of pitch diameter tolerances have been published in the American Standards Association pamphlet, ASA B1.1-1935. It is necessary to refer only to a class number, as Class 1, 2, or 3, in the order of accuracy. In Classes 2 and 3 the tolerances are figured from a common basic pitch diameter, oversize for nuts, and undersize for bolts. (See Fig. 2). In Class 1 the nut is figured from the basic pitch diameter, but the bolt runs undersize from a diameter slightly less than the basic pitch diameter. In all three classes the amount of tolerance is ex-

tremely small compared to other dimensions of the thread.

Often it is misunderstood that one class of tolerance is of better "quality" than another simply because the tolerance permitted is smaller. This is not true, for quality of a product is that which fits it for a given use and is meaningless when considered apart from this use. For example, a nut of Class 1 fit is of the best quality where it must assemble freely, simply because the over-tightness of Class 2 or Class 3 tolerance is avoided.

Next, consider the effect of different kinds of thread variations. First, consider pitch diameter variations alone, it being assumed that thread angle and spacing of mating product threads are perfect. In this case the mating threads are in uniform contact throughout the thread length, but their pitch diameters are offset by the amount of the variation. This is illustrated in Fig. 2. The net effect is that the thickness of the threads over the width of contact is slightly reduced and the air gap behind the non-working side of the thread is increased. This has no practical effect on the strength of the connection and is negligible in proportion to increases in strength which may be obtained by changes in material or otherwise at relatively small expense. In any case, advantage cannot be taken of the slight increase in thread strength developed by close pitch diameter tolerances because the design of bolts and nuts is such that the bolt breaks before the threads strip with any reasonable variation in pitch diameter, even beyond that usually allowed.

Still considering only pitch diameter variations, what is the effect on loosening of threads during vibration? The well known elasticity of metal makes it immediately give a little upon the application of even the slightest pressure. Under load, the threads bend, the nut compresses axially and swells radially. The bolt stretches, but these deflections are extremely small. A bolted connection is really a rigid joint yet there is just that minute spring of parts which keeps them light in spite of the rack and strain of vibrating loads.

Difference in pitch diameter between threads cannot change this property of metal.

The theoretical, uniform contact considered above does not occur with green, unused threads. They will contact only on small local areas. As load is progressively applied, it might appear that these local areas would take an undue proportion of load, with possible local failure. This might occur with threads in a hard, unyielding material such as glass, cast iron, or hardened steel of, say, 350 Brinell. With materials used for general purpose bolts and nuts, one part or the other is made of material having sufficient malleability to withstand the slight plastic deformation necessary to give threads a good seating.

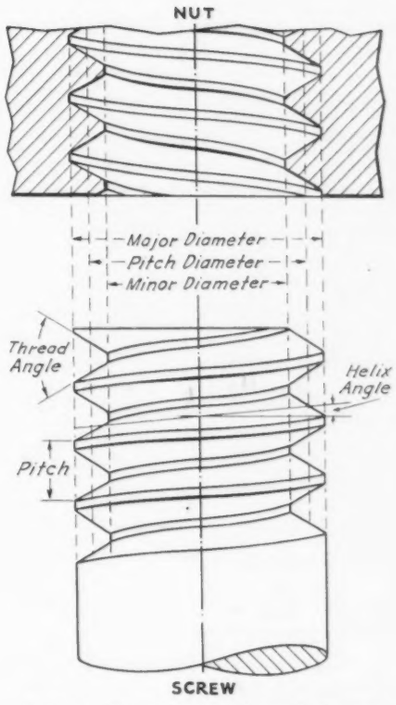


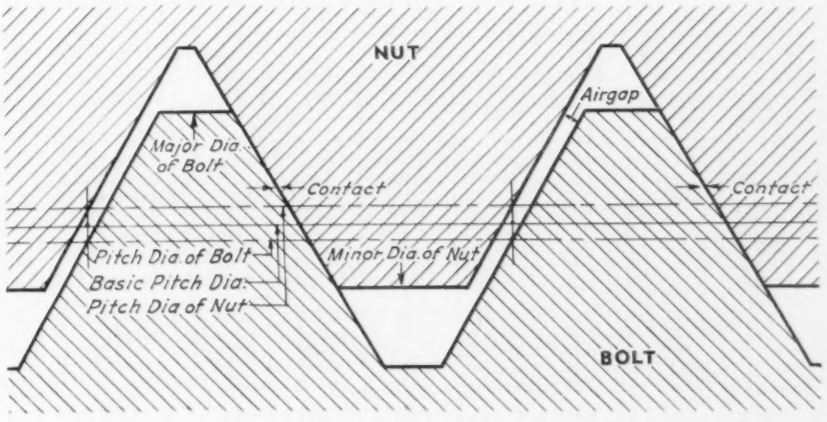
Fig. 1—Elements of thread dimensions.

From the preceding discussion it is apparent that reasonable latitude in pitch diameter tolerance can be permitted regardless of the material used, since it has no practical effect on thread strength or loosening under vibration. It is equally clear that slight angle and spacing variations of general purpose bolts and nuts, which are made of malleable materials resolve into simple pitch diameter variations which are not detrimental.

For extreme or specific assembly requirements, more or less latitude may be necessary. Closer tolerances may be needed where long thread engagement is used, where materials of both parts are unusually hard, where oil seepage must be avoided, or to provide a drive fit. A definite clearance between parts may be used for extreme ease of assembly, to give room for plating, or to prevent seizure under high-temperature service. The unique demands of these specialized applications, however, should not be reflected in specifications for general purpose bolts and nuts whose only requirement is that they assemble easily and are strong enough to break the bolt. This requirement is readily met by threads regularly produced.

Users are urged to specify thread tolerances for general purpose bolt and nut products that are commercially available rather than those that require special handling or machine setup and which result in delayed deliveries, higher cost, and slower production without compensating advantages. This is particularly important today when national defense makes peak production necessary.

Fig. 2—Fit of bolt and nut.



Revised SAE Steels

FOR the first time since 1935, a general revision has been made in SAE steel specifications. The revised standards provide for 72 carbon and alloy grades and 12 corrosion and heat-resisting alloys —a total of 84 in place of the 109 grades listed in the 1940 SAE handbook. Furthermore, a new classification of primary and secondary grades has been made. Primary steels are those used in substantial quantities; secondary steels are those considered essential by certain users, but not used extensively. The listing will indicate to users the limited source materials and will encourage them, where practical, to adopt primary steel for their purpose.

The revised series, which are reproduced on these pages from the 1941 SAE Handbook, are the result of nearly a year's work by the iron and steel division of the SAE Standards Committee. Data were obtained on the use of SAE steels from machine tool builders, electrical manufacturers, railroads and scores of other non-automotive users, as well as from every part of the automotive industry itself. Final decisions were reviewed in cooperation with a technical committee of the American Iron and

CARBON STEELS

SAE No.		Carbon Range	Manganese Range	Phosphorus Max.	Sulfur Max.
Primary	Secondary				
1010	....	0.05–0.15	0.30–0.60	0.045	0.055
1015	....	0.10–0.20	0.30–0.60	0.045	0.055
X1015	....	0.10–0.20	0.70–1.00	0.045	0.055
1020	....	0.15–0.25	0.30–0.60	0.045	0.055
1020	....	0.15–0.25	0.70–1.00	0.045	0.055
1025	....	0.20–0.30	0.30–0.60	0.045	0.055
....	X1025	0.20–0.30	0.70–1.00	0.045	0.055
1030	....	0.25–0.35	0.60–0.90	0.045	0.055
1035	....	0.30–0.40	0.60–0.90	0.045	0.055
1040	....	0.35–0.45	0.60–0.90	0.045	0.055
1045	....	0.40–0.50	0.60–0.90	0.045	0.055
1050	....	0.45–0.55	0.60–0.90	0.045	0.055
1055	....	0.50–0.60	0.60–0.90	0.040	0.055
1060	....	0.55–0.70	0.60–0.90	0.040	0.055
....	1065	0.60–0.75	0.60–0.90	0.040	0.055
....	X1065	0.60–0.75	0.90–1.20	0.040	0.055
1070	....	0.65–0.80	0.60–0.90	0.040	0.055
1075	....	0.70–0.85	0.60–0.90	0.040	0.055
1080	....	0.75–0.90	0.60–0.90	0.040	0.055
1085	....	0.80–0.95	0.60–0.90	0.040	0.055
1090	....	0.85–1.00	0.60–0.90	0.040	0.055
1095	....	0.90–1.05	0.25–0.50	0.040	0.055

FREE CUTTING STEELS

SAE No.		Carbon Range	Manganese Range	Phosphorus Range	Sulfur Range
Primary	Secondary				
1112	....	0.08–0.16	0.60–0.90	0.09–0.13	0.10–0.20
X1112	....	0.08–0.16	0.60–0.90	0.09–0.13	0.20–0.30
1115	....	0.10–0.20	0.70–1.00	0.045 max.	0.10–0.20
X1314	....	0.10–0.20	1.00–1.30	0.045 max.	0.10–0.20
X1315	....	0.10–0.20	1.30–1.60	0.045 max.	0.10–0.20
X1330	....	0.25–0.35	1.35–1.65	0.045 max.	0.10–0.20
X1335	....	0.30–0.40	1.35–1.65	0.045 max.	0.10–0.20
X1340	....	0.35–0.45	1.35–1.65	0.045 max.	0.10–0.20

MANGANESE STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.
Primary	Secondary				
1330	....	0.25–0.35	1.60–1.90	0.040	0.050
1335	....	0.30–0.40	1.60–1.90	0.040	0.050
1340	....	0.35–0.45	1.60–1.90	0.040	0.050
....	1350	0.45–0.55	1.60–1.90	0.040	0.050

NICKEL STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Nickel Range
Primary	Secondary					
2315	....	0.10–0.20	0.30–0.60	0.040	0.050	3.25–3.75
2330	....	0.25–0.35	0.50–0.80	0.040	0.050	3.25–3.75
2340	....	0.35–0.45	0.60–0.90	0.040	0.050	3.25–3.75
2345	....	0.40–0.50	0.60–0.90	0.040	0.050	3.25–3.75
....	2515	0.10–0.20	0.30–0.60	0.040	0.050	4.75–5.25

NICKEL CHROMIUM STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Nickel Range	Chromium Range
Primary	Secondary						
....	3115	0.10–0.20	0.30–0.60	0.040	0.050	1.00–1.50	0.45–0.75
3120	....	0.15–0.25	0.50–0.80	0.040	0.050	1.00–1.50	0.45–0.75
....	3130	0.25–0.35	0.50–0.80	0.040	0.050	1.00–1.50	0.45–0.75
3135	....	0.30–0.40	0.50–0.80	0.040	0.050	1.00–1.50	0.45–0.75
3140	....	0.35–0.45	0.60–0.90	0.040	0.050	1.00–1.50	0.45–0.75
X3140	....	0.35–0.45	0.60–0.90	0.040	0.050	1.00–1.50	0.60–0.90
3145	....	0.40–0.50	0.60–0.90	0.040	0.050	1.00–1.50	0.45–0.75
3150	....	0.45–0.55	0.60–0.90	0.040	0.050	1.00–1.50	0.45–0.75
....	3215	0.10–0.20	0.30–0.60	0.040	0.050	1.50–2.00	0.90–1.25
....	3220	0.15–0.25	0.30–0.60	0.040	0.050	1.50–2.00	0.90–1.25
....	3240	0.35–0.45	0.30–0.60	0.040	0.050	1.50–2.00	0.90–1.25
....	3245	0.40–0.50	0.30–0.60	0.040	0.050	1.50–2.00	0.90–1.25
....	3250	0.45–0.55	0.30–0.60	0.040	0.050	1.50–2.00	0.90–1.25
3312	....	max. 0.17	0.30–0.60	0.040	0.050	3.25–3.75	1.25–1.75
...	3415	0.10–0.20	0.30–0.60	0.040	0.050	2.75–3.25	0.60–0.95

[1] Silicon range of all SAE basic open hearth alloy steels shall be 0.15–0.30. For electric and acid open hearth alloy steels, the silicon content shall be 0.15 minimum.

Steel Institute, which had recently completed a survey of its own, and in general, the conclusions reached by the two separate groups with respect to popular and desirable compositions were similar.

Meanwhile, the American Iron and Steel Institute has issued two manuals on standard chemical compositions for carbon and alloy steel by type of manufacture, that is, acid or basic open hearth, bessemer and electric furnace. While based on the SAE nomenclature, the new series are somewhat confusing and in the example of carbon steel mill products encompass almost three times as many grades as found in the 1000 series (such as 1020) of SAE specifications.

It is the belief of the SAE committee that this first step in the direction of simplification will inspire a determination on the part of both steel makers and steel users to seek further diminution in varieties, to the end that increased volume in fewer production streams will facilitate more rapid deliveries and insure lower steel costs.

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MOLYBDENUM STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Chromium Range	Nickel Range	Molybdenum Range
Primary	Secondary							
X4130	....	0.25–0.35	0.40–0.60	0.040	0.050	0.80–1.10	....	0.15–0.25
4140	....	0.35–0.45	0.60–0.90	0.040	0.050	0.80–1.10	....	0.15–0.25
4150	....	0.45–0.55	0.60–0.90	0.040	0.050	0.80–1.10	....	0.15–0.25
4320	....	0.15–0.25	0.40–0.70	0.040	0.050	0.30–0.60	1.65–2.00	0.20–0.30
X4340	....	0.35–0.45	0.60–0.90	0.040	0.050	0.60–0.90	1.65–2.00	0.20–0.30
4615	....	0.10–0.20	0.40–0.70	0.040	0.050	....	1.65–2.00	0.20–0.30
4620	....	0.15–0.25	0.40–0.70	0.040	0.050	....	1.65–2.00	0.20–0.30
4640	....	0.35–0.45	0.50–0.80	0.040	0.050	....	1.65–2.00	0.20–0.30
4815	....	0.10–0.20	0.40–0.60	0.040	0.050	....	3.25–3.75	0.20–0.30
4820	....	0.15–0.25	0.40–0.60	0.040	0.050	....	3.25–3.75	0.20–0.30

CHROMIUM STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Chromium Range
Primary	Secondary					
5120	....	0.15–0.25	0.60–0.90	0.040	0.050	0.60–0.90
5140	....	0.35–0.45	0.60–0.90	0.040	0.050	0.80–1.10
5150	....	0.45–0.55	0.60–0.90	0.040	0.050	0.80–1.10
52100	....	0.95–1.10	0.20–0.50	0.030	0.035	1.20–1.50

CHROMIUM VANADIUM STEELS[1]

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Chromium Range	Vanadium	
Primary	Secondary						Min.	Desired
....	6135	0.30–0.40	0.60–0.90	0.040	0.050	0.80–1.10	0.15	0.18
6150	....	0.45–0.55	0.60–0.90	0.040	0.050	0.80–1.10	0.15	0.18

SILICON MANGANESE STEELS

SAE No.		Carbon Range	Manganese Range	Phosphorus, Max.	Sulfur, Max.	Silicon Range
Primary	Secondary					
9250	..	0.45–0.55	0.60–0.90	0.040	0.050	1.80–2.20
9260	....	0.55–0.65	0.60–0.90	0.040	0.050	1.80–2.20

[1] Silicon range of all SAE basic open hearth alloy steels shall be 0.15–0.30. For electric and acid open hearth alloy steels, the silicon content shall be 0.15 minimum.

CHROMIUM NICKEL AUSTENITIC STEELS—NOT CAPABLE OF HEAT TREATMENT

SAE No.	AISI[1] Type	Carbon	Manganese, Max.	Silicon, Max.	Phosphorus	Sulfur	Chromium Range	Nickel Range	Molybdenum	Selenium Range	Titanium or Columbium
30615 (type 1)	303	0.15 Max.	2.00	0.75	0.04 Max.	0.18–0.35	17.00–20.00	7.00–10.00	0.60 Max.	....	....
30615 (type 2)	303	0.15 Max.	2.00	0.75	0.12–0.17	0.04 Max.	17.00–20.00	7.00–10.00	0.60 Max.	0.15–0.35	....
30705	321	0.08 Max.	2.50	1.50	0.03 Max.	0.03 Max.	17.00 Min.	8.00 Min.	....	....	0.40[2] Min. 0.70[3] Min.
	347										
30805	316	0.10 Max.	2.50	0.75	0.03 Max.	0.03 Max.	16.00–18.00	10.00–14.00	2.00–3.00	....	....
30905	304	0.08 Max.	2.00	0.75	0.03 Max.	0.03 Max.	18.00–20.00	8.00–10.00	....	....	....
30915	302	0.08–0.15	2.00	0.75	0.03 Max.	0.03 Max.	17.00–20.00	7.00–10.00	....	....	....

STAINLESS CHROMIUM IRONS

SAE No.	AISI[1] Type	Carbon	Manganese, Max.	Silicon, Max.	Phosphorus, Max.	Sulfur	Chromium Range	Nickel Range	Molybdenum, Max.
51210	410	0.08–0.15	0.60	0.50	0.03	0.03 Max.	11.50–13.00	....	....
51310	414	0.08–0.15	0.60	0.50	0.03	0.03 Max.	11.50–13.50	1.25–2.00	....
51335	420	0.25–0.40	0.60	0.50	0.03	0.03 Max.	12.00–14.00	....	....
X51410	416	0.13 Max.	1.20	0.75	0.04	0.18–0.35	12.00–14.00	....	0.60
51710	430	0.12 Max.	0.60	0.50	0.03	0.03 Max.	16.00–18.00	....	....

[1] American Iron and Steel Institute.
[2] Minimum if Titanium is used.
[3] Minimum if Columbium is used.

Precleaning Aids Spot

BECAUSE of the high electrical and thermal conductivity of aluminum alloys, spot welding of aircraft sheets is difficult at best. The problem is aggravated by the fact that an oxide film always exists at the surface and sets up a resistance at the contact points just where it is not wanted. This timely article describes some newly developed techniques for chemically cleaning aluminum alloys preparatory to resistance spot welding so that the unavoidable oxide film is fresh or nascent and is of a controlled amount.

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ACCELERATION of airplane production is so critically important in these days of swiftly moving events that any method or material facilitating the speeding up even of a single operation should be examined and studied to appraise its advantages. So recent and new are the developments that have occurred in connection with the surface preparation of aluminum alloys for resistance spot welding, particularly of non-structural parts used in airplane construction, that up until now little information has been readily available on the subject. It is for that reason a description of the work already done along these lines and the advantages obtained should prove interesting to airplane manufacturers or sub-contractors. Specially designed materials and new methods of application have been established in a number of aircraft plants, where they have contributed to the speeding up of production on certain fabricating operations.

In order to obtain strong, uniform spot welds on aluminum or aluminum alloys with a minimum amount of delay caused by the necessity of cleaning electrodes, it is necessary that the parts to be welded should be free of all oil, grease, dirt, identification paint, etc., and that the old aluminum oxide film should be removed. If proper surface preparation is provided, difficulty in machine manipulation will be reduced and uniformity of welds improved.

Two general methods are in use for preparing aluminum for spot welding: mechanical means, such as steel wheel scratch brushing or the use of abrasives, and chemical cleaning. With mechanical methods, considerable hand labor is required and a non-uniform surface results due to the inability of the operator to control the amount of oxide (actually metal) removed from the surface. Since time is of tremendous importance in the aircraft industry, hand cleaning is obviously unsatisfactory. Chemical cleaning methods provide more uniform and rapid results. Of the chemical methods, a paste made of gum tragacanth and hydrofluoric acid has up to now been most widely used. The choice of this technique may be due to the recommendation of these materials by the U. S. Navy in its specifications on spot welding. With the immersion method, solutions of hydrofluoric acid at a strength of about 3 per cent are also being used in a number of plants. Aside from the hazards associated with the handling of hydrofluoric acid in either concentrated or dilute form, the material has other disadvantages. These consist principally in the fact that it has no grease removing properties and when used with the tank method quickly becomes contaminated.

New Materials Developed

Having these problems in mind, the research department of Oakite Products, Inc., decided to devote its efforts to designing cleaning materials capable of removing all the various types of contamination encountered in the aircraft industry, plus the removal of the aluminum oxide film. Cooperating in this work were a number of aircraft manufacturers who made possible the facilities for conducting tests under actual operating conditions. It will suffice to say at this time that the results of this research work and the many exacting tests, have been most illuminating and satisfactory, and mark a big forward step in the preparatory treatment of aluminum surfaces, from a performance and production standpoint.

In order to visualize the problem of preparing aluminum for spot welding, it is helpful to understand a few simple facts concerning aluminum and its alloys. Although the following information is elementary from a metallurgical standpoint, it may be of assistance to spot weld machine operators and is therefore included. Aluminum is a very sensitive metal which is readily oxidized by the oxygen of the air. The aluminum oxide film formed is extremely tenacious and clings to the surface, forming an insulating layer which protects the underlying metal from further oxidization. It is this oxide film which gives aluminum its stability. Also, it is the same film which interferes with satisfactory welding unless it is removed or reduced to the state of being a thin, newly-formed film.

Pure aluminum does not possess all the desirable qualities which can be obtained by alloying or incorporating other metals with it. For this reason, numerous alloys have been developed to meet various needs. The most common of these used in the aircraft industry is 24S. This alloy contains 4.5 per cent copper, 0.6 manganese, and 1.5 per cent magnesium, the balance being aluminum. The presence of these other metals in the alloy makes it possible to heat-treat 24S and thereby greatly increase its strength.

As in many other matters, advantages gained in one direction introduce difficulties in another. In the case of 24S alloy, the presence of other metals makes the

Welding of Aluminum

By V. D. SMITH
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alloy much more susceptible to corrosion. To offset this, The Aluminum Co. of America developed Alclad alloys. Alclad is a sandwich in which the bread layers are pure aluminum, while the thick meat center is composed of the far stronger alloy. The pure aluminum layers represent about 10 per cent of the total thickness. Some of the protection of this type metal is derived through having a continuous coating of the pure metal over the underlying alloy, while some of it is derived from the fact that the external layer has a higher solution potential and will, therefore, protect electrochemically. Corrosion will "weather away" the pure metal more rapidly than the alloy, thus saving the alloy until a considerable amount of the pure metal has been spent.

Another important alloy in the aircraft industry is 52S. This alloy contains 2.5 per cent magnesium and 0.25 per cent chromium. It possesses excellent corrosion resisting qualities and is used where this characteristic is of importance. Other alloys are in use, but they have characteristics comparable to those described.

The methods developed or procedures to be followed for preparatory cleaning are primarily dependent upon the type of finish required and the alloys to be welded. These finishes may be described as the "mat finish" process and the "mill finish" process. For the mat finish process an alkaline etching bath is employed, while for the mill finish process an acid type material is used. Both methods require a preliminary cleaning operation if the work is very oily, and as some parts are always machined or formed, it is best to plan to process everything by the same method. These steps will be outlined later and the following explanation is given to elaborate on the requirements.

Mat Finish Process

The mat finish process, which is preferred for non-Alclad copper bearing aluminum alloys, produces a fine grain uniform etch which has certain advantages if the parts are subsequently to be painted, as it provides a better bond for the paint. The first step required to carry out this process is to thoroughly clean the aluminum parts with Oakite "Aviation" cleaner to remove all oil, grease, stamping and drawing compounds, identification paints, or any other contaminating material. At this time it is usually advisable to produce what is called a "no-break" or chemically clean surface. This preliminary cleaning should be followed by a cold running rinse. The parts should then be immersed in the special etching bath. The time required for this operation varies with the alloy as some are more resistant to attack than others. On removal from the etching bath, the parts are again rinsed and given a short immersion in a 50 per cent by volume solution of cold nitric acid. The purpose of this is to remove the black copper oxides which remain on the copper bearing alloys. After a final rinse, the parts are ready for welding. The chart, Fig. 1, shows sequence of operations required in connection with mat finish process.

In localities having soft water, drying is unnecessary. In fact, some welders prefer to weld while wet. However, in certain hard water areas it has been found that drying is necessary in order to re-

FIGS. 1 and 2—Corresponding sequences of operations on mat and mill finish processes for preparing aluminum surfaces before spot welding.

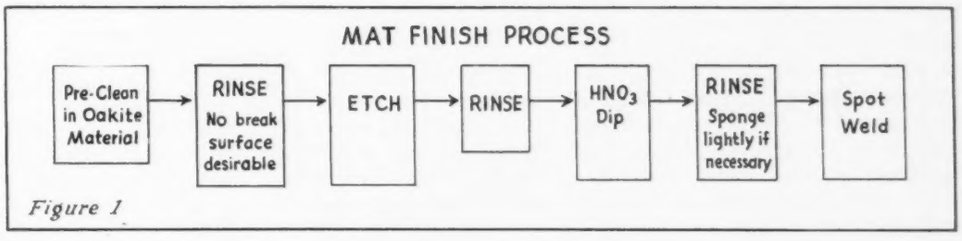
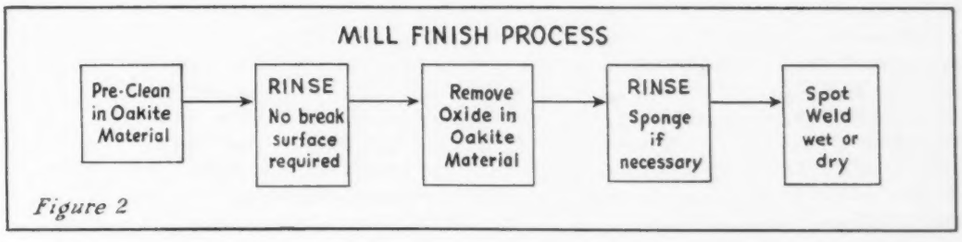


Figure 1


MILL FINISH PROCESS
Pre-Clean in Oakite Material
RINSE No break surface required
Remove Oxide in Oakite Material
RINSE Sponge if necessary
Spot Weld wet or dry
Figure 2

move lime salts and to prevent spotting.

When the mill finish process is required, the preliminary cleaning is the same as that outlined in the preceding paragraph with particular emphasis on the recommendation that a "no-break" or chemically clean surface be obtained. After the preliminary cleaning, a non-etching acid type material is used for the oxide removal. This should be followed by a rinse. What actually happens in the etching bath is that the old aluminum oxides are dissolved or replaced so by the time the parts are ready for welding, only a thin, uniform, newly formed film is encountered. Fig. 2 shows sequence of operations required in connection with the mill finish process.

As previously stated, either method may be used on any alloy, but it is desirable to select the method which will produce the type of surface most desired by a particular plant. In the mat finish process where an alkaline etch is used, not only the oxide is removed, but some of the metal goes into solution also. The reduction in thickness is negligible, but the character of the surface is decidedly different from that produced by the mill finish process, as Fig. 3 indicates. With the latter method, only the surface oxides are removed and except for a slight haze, there is very little change in the appearance of the surface.

Equipment Required

In order to carry out these steps certain equipment must be provided. This consists of a series of tanks, the dimensions of which should be such that the largest part requiring preparation by this method may be completely immersed. The tanks needed for the precleaning, etch operation and rinse for the mat finish process, may be made of welded black iron. The tank for the nitric acid may also be made of black iron, but must be finished with an acid proof lining capable of handling a cold solution of this acid material. Although for this method three rinses are required, only one tank need be provided, as all rinsing may be done in one tank.

For the mill finish process, iron tanks may also be used for precleaning and rinsing. For the etching solution, a tank capable of holding a hot, acid type material should be provided. This may be made of cypress or Douglas fir and fastened with stainless steel tie bolts. For heating, silver soldered copper pipe may be used.

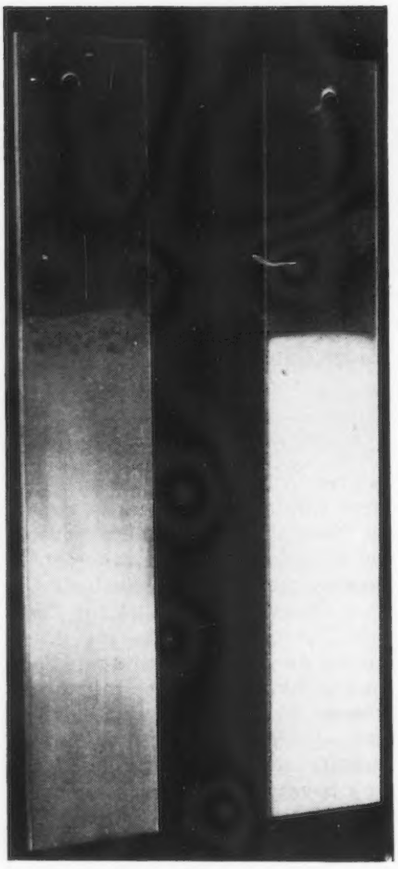


FIG. 3—At left, Alclad specimen treated by Oakite mill finish process. At right, Alclad specimen treated with Oakite mat finish process, showing the slightly etched effect.

Consideration should be given to: (1) location of the equipment used for preparation and (2) correct handling of work. Insofar as possible, the foreman in charge of the welders should also be in charge of preparation of surfaces and the equipment should be located near or adjacent to the welders. The reason for this is that there is a definite time limit within which it is desirable to weld parts after removal of the oxide film. If jurisdiction over both jobs is vested in one individual, a satisfactory schedule for preparation may readily be developed.

Another condition sometimes encountered in spot welding of aluminum is when only a local treatment is required on parts too large to be submerged in tanks. For these conditions, a suitable, inexpensive paste type material is available. It is, however, not recommended for parts which have been precleaned in alkaline solutions or solvent degreasers. On the other hand, preliminary cleaning with thinners or lacquer solvents has been found satisfactory.

In addition to the contaminating materials already mentioned, another type of film which must be contended with is that remaining after heat treating. This film discolors the surface after either air hardening or heat treating by the sodium nitrate method. It interferes with welding or anodizing but may readily be removed by the procedure described for preparing surfaces for spot welding by the mill finish process. If a plant desires to use the mat finish process for spot welding, another tank for heat treated parts will prove advantageous.

Advantages of Chemical Preparation

Chemical methods of preparation have many advantages over manual or hand methods and may be briefly summed up as follows:

1. More welds can be made before it becomes necessary to clean the electrodes.
2. A more uniform product may be obtained when the whole area is given the same treatment.
3. Parts inaccessible to the wire brush method may be cleaned thoroughly.
4. Parts may be cleaned at lower cost and about 20 times faster than with hand brushing.
5. Lower solution cost per unit cleaned.
6. Uniformity of chemical preparation eliminates almost entirely the human element and the danger of damaging parts by excessive brushing.
7. Greater consistency in strength and soundness of welds is possible due to uniformity of chemical cleaning.
8. Greater ease with which assemblies may be cleaned.

Inasmuch as resistance spot welding in aircraft work is becoming more widely used, one of the obvious objectives is to so prepare aluminum alloy surfaces as to yield as many welds as possible with less frequent cleaning of electrodes. The new methods and materials designed for this necessary surface preparation make this easily possible. Furthermore, it may be said that the Oakite materials used have been approved for this type of work in aircraft manufacturing plants.

Aircraft Problems Dominate Metal Congress

—Krivobok speaks on stainless steel; McQuaid on alloy steels; Hildorf on refinery steels; Hibert on spot welding; Kostock on arc welding; Winston on magnesium castings.

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By CHARLES POST
The Iron Age, San Francisco

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THE Western Metal Congress and Exposition last week at Los Angeles was a double barreled education on how to do business in a nation arming for defense.

For those providing America's military weapons, notably the aircraft industry with its epicenter in southern California, the Congress program was a forum on how to make the most of the finest metals the country has been able to develop.

For the balance of industry, the meeting gave an insight into the problems of maintaining production with the limited metallic resources left to those not directly working on defense.

The Exposition displays epitomized the growth and change in far Western industry since the start of the defense program and even more graphically since the Congress and Exposition were last held in Los Angeles in 1938. Three years ago petroleum production and refineries constituted the only West Coast adult market for metals; the aircraft industry was not yet fully weaned from hand production. The 1941 show was devoted almost entirely to the needs of the plane makers, and, without exaggeration, the majority of the 39,000 people who saw the exhibits and 5000 at the technical sessions were connected in some way or other with aircraft production; the petroleum industry, comparatively dormant as a steel customer, was overshadowed.

Mechanical properties of metals drew more attention than their chemical composition in Congress papers. Lectures on alloys were devoted principally to their applications in the making of aircraft and ordnance. Particular attention was given to making carbon steels and non-vital metals fill the industrial shoes of the alloy group through careful substitution and heat treatment.

In the papers presented before the American Welding Society, emphasis was placed on the relatively unexploited possibilities of spot welding. Welding of chrome-molybdenum steel, particularly tubular airplane structures, and welding of aluminum and stainless steel were discussed extensively. Shop practice and production problems drew as much debate as laboratory developments.

Exposition displays reflected increased interest in inspection and testing of welds and castings on a large scale. Rigid specifications and close tolerances demanded in aircraft manufacture were recognized in tool and instrument displays.

The exhibits in many cases were built around products of the West Coast and testified to the rapid industrial growth of that section of the country.

Sessions of the American Society for Metals were held mornings, afternoons, and evenings on all five days of the Congress. In addition to educational lecture series, special speakers dealt with current metallurgy problems and developments. The American Welding Society held its Western regional conference on the first four mornings of the week. The American Foundrymen's Association met on Thursday and Friday mornings and wound up the Congress with a dinner meeting addressed by special speakers.

Breaking precedent, announcement was made of nominees for offices of the American Society of Metals. Professor Bradley Stoughton of Lehigh University was nominated for the presidency; H. J. French, International Nickel Co., was nominated as vice-president, and Francis Foley, The Midvale Co., was proposed as treasurer.

W. H. Eisenman was managing director of the Congress, and Donald S. Clark, California Institute of Technology, was chairman of the program committee.

Some abstracts of the various technical papers follow:

Welding Chrome-Moly Steel

In the Welding Society meeting, at the Congress, F. R. Kostock, research department, North American Aviation, Inc., set forth some interesting observations on the arc welding of chrome-molybdenum sheet and tube in the aircraft industry.

Mr. Kostock stated that chromi-

um-molybdenum steel, X4130, has replaced almost entirely the use of low carbon steels for fuselage construction; X1430, deriving its great value from the fact that the alloy has a high strength-weight ratio, is easily weldable, does not require heat treatment subsequent to welding and is air hardening. This air hardening feature is most important. Because of this the weld will closely approximate the strength of the parent metal. The heat developed in the operation will cause a decrease in the tensile strength of the heat affected zone but this decrease will not exceed 10 per cent of the original.

Tubing is supplied according to U. S. Army and U. S. Navy specifications with the following analysis in percentages:

Carbon	0.27 to 0.33
Manganese	0.40 to 0.60
Chromium	0.80 to 1.10
Molybdenum	0.15 to 0.25
Phosphorus	0.040 (max.)
Sulphur	0.045 (max.)

Grain size is limited to size 5 or finer and the majority of the tubing supplied is in normalized condition. In certain specific instances it may be supplied in the heat treated state (oil quenched and drawn).

The majority of the manufacturers use the electric furnace method to make the chrome-molybdenum steel of so called "aircraft quality," but due to the great increase in demand it may be necessary to return to the open hearth method.

Proper joint design is very important in regard to aircraft welding. Lack of welding knowledge on the part of design engineers often results in "overdesigning" a joint. As a result, labor and material costs increase and unnecessary weight is added. The possibility of making a joint too rigid must also be taken into consideration. Excessive use of gussets or lengthy welds may cause failure of the tubing due to the vibrational stresses which the structure must undergo. As regards motor mounts, these are subjected to much vibrational stress and, if the joints permit no freedom of action, the weld is very likely to crack. The type of gusset used on this mount has been very satisfactory even though it is one of the oldest types. Strength and freedom to withstand vibration are both achieved.

Some difficulties have arisen in the welding of tubing to forgings. Several reasons for this have been advanced. In the first place, the carbon content of the forging is generally on the high side of the allowable, and this increases any tendency to crack which may be present. Second, the steel manufacturers usually keep the sulphur and phosphorus on the high side to increase machinability. This will cause the weld to be full of porosity due to gas formations. The weld may have a reasonably good surface, but the interior will be filled with innumerable pin holes. Third, if the chromium and molybdenum are low and the carbon high, the forging will have a lower melting point than does the tube and thus increase the difficulty encountered in welding. Last, forging and possibly machinery will undoubtedly set up unknown amounts of strain in the part. Upon welding, the localized heat may result in increasing the strain at some other point and unless this is relieved the welded joint will be subjected to strains which may result in fracture.

With regard to the relieving of the strains, it has been found the use of a gas torch to strain relieve the forging in the neighborhood of 700 deg., to 900 deg., F., is not satisfactory. Normalizing (1600 deg., F., and still air quenching) has been found to remedy the difficulty very well.

One other point might be mentioned. If the forging is large enough, it may require a larger bead to be laid down. In this case a larger electrode will necessitate a welding heat of perhaps 80 amperes in contrast to the usual limit of 50 amperes. Care must be taken lest the tubing be burned through in the process.

When all factors are considered it is apparent that electric arc welding will be the predominant type of fusion welding for aircraft structures. Research will undoubtedly lead to better material, equipment and methods.

Mr. Kostock then pointed out in conclusion that the greatest step in the future will be the formulation of a code of standard procedure for aircraft structure welding. Standardization, without question, will be difficult because much depends upon the skill and eccentricities of the operator. But, the use of certain specified equipment, for example crater eliminators, etc., may become obligatory in order to meet the rigid standards that must eventually be imposed if the aircraft industry is to increase production and maintain the dependability of its products in the face of increased output.

Magnesium Foundry Practice

The great demand for magnesium castings for aircraft construction guaranteed great interest in a lecture on "Magnesium Foundry Practice," by A. W. Winston and M. E. Brooks, presented at the American Foundrymen's Association dinner meeting during the Congress.

In this paper, Mr. Winston brought to date the developments in magnesium foundry practice since a contribution in 1935. The authors divided their paper into seven parts as follows: (1) molding sands, which covers the use of both the natural and synthetic molding sands; (2) sand agents, substances used as inhibitors in foundry molding and core sands; (3) cores, covering binders used, the use of inhibitors, typical core mixtures, pasting practice, the use of chills, and storage; (4) molding practice, which describes the use of filters for oxide films, pouring basins and gating and risering; (5) melting practice, including the open flux pot and crucible methods and describing under the latter, type of crucibles and furnaces used, melting procedure, fluxing, heating and pouring, cleaning the crucible, charges, temperature control, and large scale melting units; (6) casting finishing, in which is discussed removal of gates and risers, heat treatment, heat treating furnaces, cleaning methods, and pickling treatments; and (7) alloys, in connection with which a table gives the compositions, characteristics, and mechanical properties of magnesium sand castings.

Stainless Steel

One of the most interesting of the lecture series was that dealing with stainless steels, presented by V. N. Krivobok, director of structural research, Lockheed Aircraft Corp. This series of lectures was in reality practically a book of information, which ranged all over the field of stainless steel metallurgy and application, and presented much data of a new or interesting nature. It is impossible herein even to touch on the bulk of Mr. Krivobok's work, but the discussion on the theory of corrosion resistance was so interesting that it is reproduced in the following paragraphs.

According to Mr. Krivobok, in order to understand non-corrosive characteristics of chromium steels and also to realize the necessity of careful considerations of various factors that greatly influence the satisfactory performance of chromium bearing alloys, some of the fundamental principles must first be considered and illustrated by simple examples.

CIRCLE of stainless steel and chrome-moly plane parts in U. S. Steel exhibit. The interest in this exhibit was primarily the 18-8 stainless (type 302) tail assembly made for Vultee by Fleetwings, Inc., Bristol, Pa. This assembly is spot welded.

(A) Even iron can be said to be resistant to chemical (or corrosion) attack under certain specific circumstances, as for example in fuming nitric acid. A film, very rich in trivalent hydroxide of iron, forms on the surface and, being resistant (insoluble) to this particular acid, stops further attack upon iron. Under atmospheric conditions the film formed consists of bivalent iron hydroxide, which is readily soluble and thus non-protective. This is equally true of other metals and alloys: therefore —the behavior of metals toward attack by corrosion is determined by the nature of the formed surface film. Other factors such as (1) diffusion phenomenon between the film and parent metal, (2) the physical characteristics of the film such as brittleness or adherence, and (3) its continuity, are of definite importance, especially under conditions of service at high temperatures or in strongly oxidizing media. At room temperature the first two are of much less practical importance, but the third (continuity) is often the chief source of trouble.

(B) Some elements—and chromium belongs to this group—possess (as is well known from steel melting practice) greater affinity for oxygen than iron. According to Houdremont, if 20 per cent chromium steel is subjected to oxidation at elevated temperature, under conditions which are not strongly oxidizing, an outer oxide layer (or film) is formed containing as much as 80 per cent chromium oxide, or in 4.5 per cent silicon steel containing 45 per cent silica. Apparently

(a) The protective characteristics of the film or what is often referred to as "passivity" of the metal, depends upon the oxide formed, that is, upon chemical composition of the alloys.

(b) The film can vary considerably in the oxide content and still be protective.

(c) The type of corrosive media, be it liquid or gas also determines the type of film formed.

(d) The nature of the corrosive attacking media determines the necessary amount of chromium oxide in the particular case of chromium steels in the film to be protective and thus determines the behavior of the alloy steel under given corrosive conditions.

(e) Passivity is expressed numerically by determining electrochemical potential: the greater the passivity (the more resistant the alloy), the nearer is its potential to that of a noble metal such as Au. Measurement of potential for Fe-Cr alloys show that chromium content must be at least 12 per cent in order to approach the potential of a noble metal. That is the reason why 12 per cent chromium is about the minimum amount in stainless steels; this is also the reason why lowering of chromium content even to 10 per cent is doomed to failure for corrosion resisting properties, under normal atmospheric conditions.

Mr. Krivabok then went on to point out that "passivity" has been defined as "physical resistance" to corrosion, and it is associated with formation of *oxide film*, characterized by:

(a) high chemical stability.

(b) low solubility.

(c) low electric conductivity.

In many cases the formation of film is positively known. In more numerous cases the film is so thin it cannot be measured, but it can be shown to exist. Effectiveness of the film is determined by (1) its resistance to "break-down," (2)

its properties, such as ability to permit the diffusion of O_2.

The factors deciding break-down of an oxide film are as follows:

(1) The local contour of the surface, i. e., the method of the preparation of the surface.

(2) The thickness of the film which governs the mechanical characteristics of the film.

(3) The nature of solution.

Refining Steels

Another interesting report presented to the A.S.M. group dealt with "Steels for Oil Refinery Service," by Walter Hildorf, of Timken Steel & Tube Division.

In his discussion, Mr. Hildorf first set forth the characteristics steels must possess for satisfactory high temperature service, and indicated how these required properties vary not only in different industries but in different applications within the same industry.

The more common alloying elements were then classified, and it was shown that certain are suitable for increasing the high temperature surface stability characteristics and others for improving the strength. Certain also tend to produce a two-phased structure and, if this is not desired, the so-called ferrite and austenite formers must be balanced so that the resulting steel will be single phased.

The way in which these alloying elements have been used in the development of high temperature steels was then reviewed, and it is hoped that, on the basis of this discussion, it has been shown that each element present serves a distinct and necessary function, and that it has not been added simply for the purpose of making the alloys more complex or for increasing the number of steels available and thus complicating the picture for the designing engineer.

While the number of steels available for high temperature service may appear to be excessive, a distinct need still exists for steels capable of withstanding more severe conditions of temperature and stress, and this is especially true for continuous service at temperatures of 1500 deg. F. and higher and also for lower temperatures when the desired stresses are large and the permissible amount of deformation is very small. According to Mr. Hildorf, the next few years should see considerable developments in this particular field as certain technological processes, now in the laboratory stage, could be applied commercially if such alloys were available.

Spot Welding Aluminum

For several years now there has been much talk of spot welding supplanting riveting in aircraft structures. Thus, the treatment of this subject by C. L. Hibert, in the paper "Spotweldability of Aluminum Alloys," was particularly timely.

Mr. Hibert pointed out that spotwelding of aluminum alloys is gradually developing from an experimental stage to a recognized production method of joining aircraft parts. Prior to this time of national emergency it was regarded as a necessary evil, mostly from the fear that someone would develop the process over night and build a complete airplane for little cost. Most companies are working to the desirable conclusion of welding a complete airplane of aluminum alloys but full success has not materialized, and parts that should be welded are neglected because of their relative unimportance.

This picture is rapidly changing and any manufacturing method that will save time is being applied; and, instead of one or two spotwelding machines, a battery of 25 to 30 machines is not uncommon. Some of these units are single purpose machines designed to do a certain job efficiently. This of couse has necessitated a decided increase of personnel along with a training program to adapt men to the job.

Spotweld operators gathering experience finally realize there is an indefinable something that makes each spotwelding job different. It must occasion wonder as to why this process which has been used and worried over for so many years isn't an exact science. To begin with, it is necessary to give the indefinable something a name and call it "spotweldability," thus leaving a path open for further information on the subject. The conditions which are known to affect the "spotweldability" of aluminum alloys are: chemical composition, surface conditions, conditions under which the welding is performed, the type of service to which the product is put, and the technical education and experience of the personnel employing the process.

The size of the part and the accessibility has a large bearing on the "spotweldability" of aluminum alloys. The fact to bear in mind is that the job has to be done on a fixed machine and it is necessary to take the work to the welder. At present portable equipment cannot be used for spotwelding aluminum alloys. This complicates the picture somewhat as large spotwelded assemblies have to be partially assembled in a fixture removed for

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TOM A. TRIPLETT, president of Triplett and Barton Laboratory, Lockheed Aircraft Corp., shows the working of a densitometer to a Metal Congress visitor.

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spot welding with a possibility of the part losing the alignment.

Welding fixtures that are used to support the parts during the spotwelding, have to be of light weight construction, because they are manually supported. Most of the aluminum alloy spotwelding does not lend itself to automatic feeding or mechanical support. The reason for this is, the metal under the electrodes has to be aligned at right angles to the electrodes for best results, and a mechanical device does not have the advantage of the human touch. The work is supported by the helper or operator as a billard cue is handled, not rigidly but lightly, to permit the material to seek a level between the electrode tips.

A restricting factor on large parts is the time limit between etching and welding. The surface gradually acquires an oxide film with age. If the welding cannot be accomplished in a relatively short time, it is impossible to complete a satisfactory job.

To set any limits on the size and shape of parts that can be accommodated on spotwelding equipment is hardly possible as special equipment can be designed to reach relatively inaccessable places. It may be stated, from past experience, that the larger the physical dimensions of the part, and the heavier the gages, the less positive the results.

On most drawings the correct edge distance is shown, but due to shop errors in trimming or bend radii, parts are often received by the spotwelding section with an added handicap of insufficient edge distance.

A certain amount of material is necessary to support the zone of fusion when the metal is liquid. The molten metal is contained under very high pressure calculated in lb. per sq. in. If the solid metal boundary is not of sufficient section the weld will crack the outer edge of the material and spue out the molten metal between the plies. This condition results in low strength welds. In designing parts it is imperative to recognize this very important factor.

Parts that do not fit perfectly or are buckled, affect the "spotweldability" of aluminum alloys. The results of this condition are comparable to those found by insufficient edge distance. The lighter gage material will follow the contour of the heavier gage material and distort the finished job. An objection often heard against spotwelding is that the welding warps the work. This is not true in the majority of cases and experience will show that if the parts fit prior to spotwelding they will not be distorted afterwards.

The type of service to which the product is put bears a relationship to "spotweldability." At present most of the spotwelding of aluminum alloys is limited to secondary structure, and because aircraft is subject to corrosive atmospheres, only those alloys that are corrosion resistant may be welded. This further handicaps the use of spotwelding because the corrosion resisting alloys are not the most weldable. The Alclad alloys are relatively more difficult to weld because of the soft coating of aluminum of high melting point and conductivity. When spotwelding was first introduced the plain alloys were used in the manufacture of aircraft, and specifying spotwelding necessitated a material change to Alclad alloys which restricted the use of spotwelding. Now practically all Alclad material is used and the welding of stressed parts is somewhat restricted by the weldability of the Alclad alloys.

Restriction of spotwelding to unstressed parts is not a question of physical strength, because sufficient strength can be achieved by proper design and fabrication. It is a known fact that a properly designed part can be made comparable to a similar riveted job in strength and serviceability. The determinative is whether the job can be assured of definite quality in production.

With multifarious conditions to control, some of which are beyond the reach of scientific approach, it is extremely difficult to predict results.

In conclusion, Mr. Hibert pointed out that perhaps a non-destructive testing device that could differentiate a good weld from a poor one would answer the always pertinent question, is it welded?

Alloys in Cast Iron

In the paper, "New Information on Effects of Alloys in Cast Iron," by V. A. Crosby, of Climax Molybdenum Co., before the A.F.A., the similarities and differences between steel and cast iron with respect to their matrix characteristics and response to heat treatment were discussed, as were the differences between steel and cast iron due to the abundance of graphite in cast iron, which changes the amount of carbon in solution as the quenching temperatures vary.

Mr. Crosby pointed out the effect of alloys on the stability of iron at sub-critical temperatures, and presented data to illustrate the advantages of alloy in maintaining hardness and strength in slow cooled castings of heavy designs. Advantages of securing the right type of graphite to insure a basis for adequate comparison of alloying effects were discussed by the speaker, who stated that a normal random type of graphite secured by late graphitizing agents was considered highly desirable, particularly in test bar size sections. In larger sections, the cooling rate was usually slow enough to secure the random graphite patterns.

Gray irons of good casting properties are of first consideration, and high strength commensurate with requirements are desirable features. These features are obtainable with pearlite stabilizing elements, such as chromium and chromium - molybdenum combinations. In some cases, combinations of these alloying agents produce strengths far in excess of the additional effect of the alloys.

Some combinations produce castings that retain the as-cast strength after 1350 deg. F. draw-treatment, while losing 40 to 50 points Brinell hardness while plain irons and some alloy irons may lose as much as 17,000 lb. per sq. in. in strength with a drop of 100 points in Brinell hardness. Users of alloys, as well as iron users, were advised to weigh carefully the results desired and plan accordingly, using graphitizing elements when elimination of chill and high machining properties are desired, and, conversely, using the more strongly carbide stabilizers for castings that cool slowly.

Carbon and Alloy Steels

"Making the Most of Carbon and Low Alloy Steels," was the subject of a paper before the A.S.M. by H. W. McQuaid, Republic Steel Corp.

The object of the paper was fourfold, dealing with: (1) importance of quenched structures in obtaining the best combination of high strength and ductility when carbon and low alloy steels are heat treated; (2) importance of avoiding combinations of martensite or

(CONTINUED ON PAGE 119)

1500 TOOL STEELS

THIS is a continuation from last week of the indexing of approximately 1500 tool, metal cutting and die steels, and sintered carbides. In some instances the same steel is shown under several variations of the same name, in conformity with shop practice; the same steel is on occasion listed under a manufacturer's name and under a distributer's name; occasionally steels no longer made are indexed for the sake of full coverage; and, of course, some imported steels indexed are for the time being unobtainable. Thus, this indexing of all known tool steels should have maximum application in enabling users to locate and ascertain the properties of any steel produced in this country. This indexing of steels will be continued in successive issues of THE IRON AGE until completed.

H & R Oil Hardening
An oil hardening steel, for cold forming dies and punches, stamping, blanking and trimming dies, lamination dies, broaches, reamers, gages and all kinds of tools of intricate shapes, etc. Contains C 0.90 to 1.00, Cr 0.50 to 0.60, Mn 0.90 to 1.00, Si 0.20. Houghton & Richards, Inc., Boston.

H & R No. 1
A high speed steel, used for lathe and planer tools, form cutters, blanking dies, hot work, etc. Contains C 0.55 to 0.75, Cr 3.80 to 4.25, Mn 0.15 to 0.30, V 0.90 to 1.25, W 17.75 to 18.50, Si 0.20 to 0.35. Houghton & Richards, Inc., Boston.

H & R No. 2
A high speed steel, for all cutting tools, both roughing and finishing such as lathe and planer tools, milling cutters, twist drills, taps, reamers, blanking dies, broaches. Contains C 0.80 to 0.85, Cr 4.00 to 4.50, V 2.00 to 2.25, W 18.00 to 19.00, Mo 0.60 to 0.80, Si 0.20 to 0.50. Houghton & Richards, Inc., Boston.

H & R Vanadium
A water hardening steel, for striking and heading dies, swedging tools, etc. Contains C 1.05 to 1.15, Mn 0.25, V 0.18, Si 0.20. Houghton & Richards, Inc., Boston.

Hacksaw
A plain carbon steel. Adams & Osgood Steel Co., Boston.

Hacksaw
A special alloy steel. William Jessop & Sons, Inc., New York.

Hack Saw
A special alloy steel. Crucible Steel Co. of America, New York.

Halco
A special alloy steel. Halcomb Steel Co., Syracuse, N. Y.

Halcomb 999
A 14-4-2-5 high speed steel, for gear cutters, roll turning tools. Contains C 0.80, Cr 3.75, Co 5.35, V 1.80, W 14.00, Mo 0.55. Hawkridge Bros. Co., Boston.

Halcomb 218
Alloy hot work steel, for gripper dies, punches, die inserts, piercing mandrels. Contains C 0.38, Cr 5.00, V 0.40, Mo 1.40, Si 1.00. Crucible Steel Co. of America, New York.

Halcut
An oil-hardening or air-hardening, abrasion resistant steel, for application where toughness is more important than red hardness. Used for chipping chisels. Contains C 0.45, Cr 1.25, W 2.60, Si 0.20. Hawkridge Bros. Co., Boston.

Haldi
A wear-resisting, oil-hardening or air-hardening steel. Used chiefly for dies, tools and gages. Contains C 2.25, Cr 12.00, V 0.20, Mo 0.90. Hawkridge Bros. Co., Boston; also Halcomb Steel Co., Syracuse, N. Y.

Hampden
High carbon, high chrome, oil hardening steel for long-run dies and tools. Has wear resistance and is non-deforming. Contains C 2.10, Cr 12.50, Ni 0.50, Mn 0.25, Si 0.25. Carpenter Steel Co., Reading, Pa.

Hardnair
Air hardening, non-deforming die steel, for drawing dies, blanking and forming dies, gages, master hobs, punch plates, trimming dies, thread rolling dies. Contains C 1.30, Cr 5.00, Mn 0.45 to 0.60, V 0.25 to 0.40, Mo 1.10 to 1.35, Si 0.80 to 1.10. Atlantic Steel Co., New York.

Hardrite
A non-deforming steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Hargus
An oil hardening non-deforming steel, for punching and blanking dies, etc. Agawam Tool Co., West Springfield, Mass.

Hartmetall
A European tungsten carbide. See Tungsten Carbide.

Hawk Brand
A water-hardening carbon tool steel, for tools and dies. Contains C as desired. Hawkridge Brothers Co., Boston.

Hawk Cold Header Die
A water-hardening tough tool steel, for heading dies. Contains C 0.95, Mn 0.25, Si 0.25. Hawkridge Brothers Co., Boston.

Hawk H Roll Steel
A water-hardening improved roll steel. Contains C 0.85 to 1.10, Cr 1.00 to 1.50, Mn 0.30 to 0.60, Si 0.15 to 0.30. Hawkridge Brothers Co., Boston.

Hawk Impacto
A water-hardening steel, for silverware blanking and striking dies. Deep hardening. Fine grain. Contains C 0.90 to 1.10, Mn 0.30 to 0.40, Si 0.40 to 0.50. Hawkridge Brothers Co., Boston.

Hawk 977
An oil-hardening steel, for rivet punches. Extra tough, high impact value, with high hardness. Contains C 0.90, Cr 0.09, Mn 0.84, Mo 0.72, Si 0.25. Hawkridge Brothers Co., Boston.

Hawk Prefak
An oil-hardening steel, same as Ketos steel. Contains C 0.90, Cr 0.50, Mn 1.25, W 0.50. Hawkridge Brothers Co., Boston.

Hawk 777
An oil-hardening steel for rivet punches. Extra tough, high impact value, with high hardness. Contains C 0.70, Cr 0.09, Mn 0.84, Mo 0.72, Si 0.24. Hawkridge Brothers Co., Boston.

Hawk Special
A water-hardening steel, for taps, drills, threading hobs, milling cutters, forming tools. Contains C as desired, Cr 0.25. Hawkridge Brothers Co., Boston.

Hawk Vanadium
A water-hardening tough tool steel for punches. Contains C as desired, V 0.20. Hawkridge Brothers Co., Boston.

Haynes Stellite
A non-ferrous, red hard cutting metal for tool bits, milling cutters, form tools, boring and reaming blades, milling cutter blades, welded tip tools, etc. Contains Cr. max. 35.00, Co min. 40.00, W max. 20, and balance max. 9. Haynes Stellite Co., Kokomo, Ind.

HC-HC
A non-deforming steel, containing Cr. Delaware Tool Steel Corp., Wilmington, Del.

Hecla
A special alloy steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Hercules
Oil hardening steel, for dies and machinery parts. Resistant to fatigue and fairly tough. Contains C 1.00, Cr 0.50, Mn 0.25, V 0.20, Si 0.25. Universal-Cyclops Steel Co., Bridgeville, Pa.

Herculite
A fatigue resisting tool steel. Contains C 0.54, Ni 2.6, V 0.10, Mo 0.45, Si 1.00. Midvale Co., Nicetown, Philadelphia.

Hidalgo
Water hardening steel, for chisels, shear blades, punches, etc. Is extra tough. Contains Cr 1.00, W 1.50-2.00. Hidalgo Steel Co., Inc., New York.

Hidalgo-RL
Water hardening steel for finishing cuts on very hard material, containing C 1.25, Cr 0.40-0.50, W 5.50. Hidalgo Steel Co., Inc., New York.

High Carbon Alloy
A special alloy steel. Edgar T. Ward's Sons Co., Pittsburgh.

High Production
A high carbon, high chromium air hardening steel, for blanking and drawing dies, tin cut edges, coining, embossing, mandrels, any others where a freedom from distortion and quality of non-shrinking die steel is required. Contains C 1.55, Cr 11.50, Mo 0.75. A Milne & Co., New York.

High Speed
A molybdenum high speed steel. Midvale Co., Philadelphia.

High Speed
A high speed steel, containing W. Pittsburgh Tool Steel Wire Co., Monaca, Pa.

High Speed No. 2
A high speed steel, containing W. Edgar Allen Steel Co., New York.

Hi-Pro
A high carbon, high chrome die steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Hi-Van
A high speed steel, containing Cr, W, V and Mo. Peninsular Steel Co., Detroit.

H. M. Blue Chip
A high speed steel. Firth-Sterling Steel Co., McKeesport, Pa.

H-9 Extra
Water hardening die steel for header dies and punches, striking dies, coining dies, etc. Deep penetration of hardness, and fatigue resistance. Contains C 0.90, Mn 0.35, Si 0.35. Carpenter Steel Co., Reading, Pa.

Hobalite
A water hardening steel, for mold dies, etc. Contains C 0.05, Mn 0.15, P 0.010, S 0.010, Si 0.02. Agawam Tool Co., West Springfield, Mass.

Holcomb Hot Work
An oil-hardening or air-hardening steel for hot coining dies. Good red hardness. Contains C 0.40, Cr 3.50, W 8.75, Mo 0.25. Hawkridge Brothers Co., Boston.

Hollobar
A non-deforming steel, containing Mn. Peninsular Steel Co., Detroit.

Hollow Drill
A plain carbon steel. Bethlehem Steel Co., Bethlehem, Pa.

Hollow Drill
A special alloy steel. Horace T. Potts Co., Philadelphia.

Hollow Drill
A plain carbon steel. Ziv Steel & Wire Co., Chicago.

Hollow Drill
A water hardening steel, for rock drilling. Contains Cr 1.00 to 1.10, Mn 0.35, Si 0.30. Agawam Tool Co., West Springfield, Mass.

Hot Die
A chrome hot work die steel. Latrobe Electric Steel Co., Latrobe, Pa.

Hot Die
A special alloy steel, containing W. Adams & Osgood Steel Co., Boston.

Hot Die
A special alloy steel, containing Cr, W and V. Canadian Atlas Steels, Ltd., Welland, Ont., Canada.

Hot Die No. 2
A special alloy, containing Cr. Braeburn Alloy Steel Corp., Braeburn, Pa.

Hotform
A special alloy steel, containing Si, W, Mo and Cr. Vanadium-Alloys Steel Co., Latrobe, Pa.

Hot Stamping Alloy Die
A special alloy steel. Edgar T. Ward's Sons Co., Pittsburgh.

Hot Work No. 23
A special alloy steel, containing Cr, W and V. Peninsular Steel Co., Detroit.

Hot Work No. 22
A special alloy steel, containing Cr, W and V. Peninsular Steel Co., Detroit.

Howe Brown
An extra or special carbon steel. Crucible Steel Co. of America, New York.

HPS
A special hot work steel, containing W, Cr and V. Poldi Steel Works, New York.

H. R. W.
Hot work steel for dies. Contains C 0.95, Cr 3.75, V 0.15. Henry Disston & Sons, Inc., Philadelphia.

H. T. W.
A special alloy steel. Bethlehem Steel Co., Bethlehem, Pa.

Huron
High-carbon-chrome oil hardening steel, for long run blanking dies, plug gages, drawing dies, etc. Very high resistance to abrasion. Not as tough as Ontario. Contains C 2.00, Cr 12.00, V 1.00. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also Edgcomb Steel Co., Philadelphia.

H. V.
A high speed steel of the 18-4-2 type. Bethlehem Steel Co., Bethlehem, Pa.

H. V. Blue Chip
High speed steel, for high speed finishing tools, containing C 0.82, Cr 4.00, V 2.00, W 18.00. Firth-Sterling Steel Co., McKeesport, Pa.

H. W. D.
Hot work die steel, for hot punches and dies. Has great toughness. Contains C 0.40, Cr 5.00, Mn 0.65, V 0.15, W 1.15, Mo 1.50, Si 0.80. Firth-Sterling Steel Co., McKeesport, Pa.

H. Y. C. C.
A high carbon, high chrome steel for axle burnishing tools, blanking, dies, broaches, burnishing rolls, clay pulverizing blades, cold extrusion dies, etc. Contains C 2.25, Cr 12.00, V 0.25. Crucible Steel Co. of America, New York.

Hyco
Oil or air hardening, non-deforming steel for dies, punches, rivet sets, rolls, etc. Has maximum wear and abrasion resistance, very low distortion, deep hardness. Contains C 2.00, Cr 12.50, Mn 0.30, V 1.00, Mo 0.75, Si 0.30. Lehigh Steel Co., New York.

Hyco
A cobalt high speed steel, especially adaptable to cutting hard and scaly material, where excessive heat is generated in machining operation. Contains Cr 4.00 to 4.25, Co 3.00 to 5.50, W 18.00 to 18.50, Mo 1.30. A. Milne & Co., New York.

Hy-Lo
A non-deforming steel. Boyd-Wagner Co., Chicago.

Hypro-62
A special alloy steel, containing Cr. Boyd-Wagner Co., Chicago.

Hypro Tool
Production die steel. Contains C 2.00, Cr. 0.12. Bissett Steel Co., Cleveland.

Hy-Ten Alloy Chisel Steel
Water hardening steel, for battering tools, chipping chisels, cold chisels, etc., containing C 0.75, Cr 0.50, Mn 0.35. Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

Hy-Ten B No. 5
Water hardening steel, for cold cutting and heading dies, centers, mandrels, reamers, gages, etc., containing C 1.00, Mn 0.25. Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

I

Ideor
Water or oil hardening steel, for chisels, hot and cold sets, etc. Is very tough. Contains C 0.40, Cr 1.00, Mn 0.20-0.30, W 2.00, Si 0.80-1.00. Darwin & Milner, Inc., Cleveland.

Imperial Major
A high speed steel with great resistance to wear, and high red hardness. Quenched in dry air blast or oil. For high speed cutting tools. Contains Cr 4.00 to 5.00, Co 12.0, V 0.50 to 1.00, W 0.21 to 0.22, Mo 0.50. A. Milne & Co., New York; also Edgar Allen Steel Co., New York.

Imperial Special
An 18-4-1 (also an 18-4-2) high speed steel. Edgar Allen Steel Co., New York.

Intra Steel
Special alloy, water hardening steel, for reamers, taps, blanking dies. Has high fatigue resistance. Contains C 1.3, Mn 0.25, W 1.50, S 0.15. H. Boker & Co., Inc., New York.

Invaro
Oil hardening die steel, for blanking and embossing dies. Is non-shrinking, non-deforming. Contains C 0.90, Cr 0.50, Mn 1.10, W 0.50. Firth-Sterling Steel Co., McKeesport, Pa.

Invincible
Water hardening steel, for twist drills, taps and reamers. Contains C 1.08, Mn 0.40, Si 0.18. Kidd Drawn Steel Co., Aliquippa, Pa.

J

Jano
High speed steel containing Cr 4.00, V 2.00, W 19.00, Mo 0.60. Hidalgo Steel Co., Inc., New York.

Janus
A plain carbon steel. Hidalgo Steel Co., Inc., New York.

JC/C
A plain carbon steel. Ekstrand & Tholand, Inc., New York.

Jessco
A high speed steel. Edgar T. Ward's Sons Co., Pittsburgh.

Jessco (A and B)
A tungsten type, and a tungsten cobalt type high speed steels. Jessop Steel Co., Washington, Pa.

J-4 Steel
An oil hardening, tough and wear resisting steel, for backing out, caulking and chipping tools, shear blades, punches, stamping and blanking dies, etc., containing C 0.42-0.46, Si 0.60-0.80, Cr 1.20-1.40, W 2.00-2.50. William Jessop & Sons, Inc., New York.

J Hot Working Die
A special alloy steel. Jessop Steel Co., Washington, Pa.

JJ
A chrome hot work die steel. Jessop Steel Co., Washington, Pa.

JJ Hot Work
A special alloy steel. Edgar T. Ward's Sons Co., Pittsburgh.

J-Metal
A cast cobalt - chromium - tungsten alloy for cutting tools. Has considerable red hardness. Haynes Stellite Co., Kokomo, Ind. Same as Star J-Metal and Stellite Star J-Metal.

J. P. S. Steel
An oil hardening, tough and wear resisting steel, for punches, shock tools, blanking dies, taps, reamers, threading tools, drawing dies, etc., containing C 0.90-1.00, W 1.10-1.30, Cr 0.45-0.60. William Jessop & Sons, Inc., New York.

J-S
Air or oil hardening chisel steel, for punches and chisels, shear blades, rivet sets, etc. Has wide hardening range for field shops. Contains C 0.50, Cr 1.40, V 0.25, W 2.25. Firth-Sterling Steel Co., McKeesport, Pa.

K

K. D. 16
High speed steel, containing Cr 4.50, Co 10.00, V 2.20, W 16.00, Mo 1.50. Hidalgo Steel Co., Inc., New York.

Keewatin
A non-deforming steel, containing Mn. Canadian Atlas Steels, Ltd., Welland, Ont., Canada.

Kennametal K 4
A cemented tungsten carbide containing 4 per cent cobalt. For tipping tools for machining cast iron, brass, bakelite, stone, slate, asbestos and for wire-drawing dies. Has high thermal conductivity. McKenna Metal Co., Latrobe, Pa.

Kennametal KM
A general purpose steel cutting cemented hard carbide, containing the compound W TiC_2 (tungsten-titanium carbide) cemented with cobalt and tungsten for tipping lathe tools, boring tools, etc., and for machining steel up to 500 Brinell. McKenna Metal Co., Latrobe, Pa.

Kennametal K3H
A very hard steel cutting cemented hard carbide, containing the compound $WTiC_2$ (tungsten-titanium carbide) cemented with cobalt and tungsten. For use in small rounds for precision boring of steel. For tipping lathe tools. Hardest grade for steel cutting. McKenna Metal Co., Latrobe, Pa.

Ketos
An oil-hardening steel, for blanking, trimming and forming dies of intricate design. Contains C 0.90, Cr 0.50, Mn 1.25, W 0.50. Hawkridge Brothers Co., Boston.

Ketos
Oil hardening, non-deforming steel, for bakelite molding dies, broaches, gages, hobs and other forming tools, master tools, reamers, stamping and blanking dies, etc. Contains C 0.90, Cr 0.50, Mn 1.15, W 0.50. Crucible Steel Co. of America, New York.

Keystone
Finishing steel for taps, reamers and dies, containing C 1.11-1.25, Cr 0.40-0.60, Mn 0.15-0.30, V 0.15-0.25, W 1.50-1.75, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Keystone Alloy Chisel
Very tough chisel steel, for punches and shears. Contains C 0.50, Cr 1.10, W 2.00. Henry Disston & Sons, Inc., Philadelphia.

Kinite
Special alloy, non-deforming air hardening steel, for forming and blanking dies, cams, punches, plug gages, perforating dies, forming and crimping rolls, etc. Has high resistance to abrasion, fatigue resistance, toughness. Available in castings or bar stock. Contains C 1.50-1.75, Cr 12.00-13.00, Mn 0.50-0.60, Co 1.10-1.20, V 0.50-0.60, Mo 1.10-1.20, Si 0.40-0.50, S under 0.02, P under 0.02. H. Boker & Co., Inc., New York.

Kiski
Oil hardening, non-deforming steel for dies, containing C 0.90-1.00, Cr 0.43-0.57, Mn 1.00-1.20, V 0.15-0.25, W 0.45-0.70, Si 0.30-0.45. Braeburn Alloy Steel Corp., Braeburn, Pa.

K L
Hot work steel, for hot work dies. Has resistance to abrasion and heat checking. Contains C 0.35, Cr 7.50, Mn 0.60, W 7.50, Si 1.50. Universal-Cyclops Steel Co., Bridgeville, Pa.

K M
Hot work steel, for hot work dies. Has resistance to abrasion and heat checking. Contains C 0.45, Cr 7.50, Mn 0.60, W 7.50, Si 1.50. Universal-Cyclops Steel Co., Bridgeville, Pa.

K-9
An oil hardening die steel, for blanking, molding, drawing, perforating, etc. Dies, where resistance to warping and distortion is of primary importance. Contains C 0.90, Cr 0.70, Mn 1.00, W 0.50. A. Milne & Co., New York; also Edgar Allen Steel Co., New York.

KR
A special alloy steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Krokoloy
A non-deforming, air hardening steel, for machine parts, cams, and cutting, forming, trimming and drawing dies. Contains C 1.50, Cr 13.00, Ni 0.50, Mn 0.50, Co 3.50, Mo 0.85 and Si 0.60. Detroit Alloy Steel Co., Detroit.

Kromal
A special alloy steel. Amalgamated Steel Co., Cleveland.

Kromol
A molybdenum high speed steel. Jessop Steel Co., Washington, Pa.

Kronos
Water hardening steel, for chisels, crow bars, etc. Contains C 0.70-0.80, Mn 0.15-0.40, Si 0.30 max. Peter A. Frasse & Co., New York.

Krosil Chisel Steel
A tough oil-hardening steel, for cold chisels. Contains C 0.50, Mn 0.90, Mo 0.35, Si 1.50. Hawkridge Brothers Co., Boston.

Krovan
A water-hardening steel for rolls. Contains C 0.90, Cr 1.00, V 0.20. Hawkridge Brothers Co., Boston.

K S
Hot work steel, for hot work dies. Has resistance to abrasion and heat checking. Contains C 0.35, Cr 5.25, Mn 0.25, Co 0.50, V 0.20, W 5.25, Mo 0.20, Si 0.90. Universal-Cyclops Steel Co., Bridgeville, Pa.

Kutkwik
High speed steel for metal cutting. Contains C 0.60-0.75, Cr 4.00, V 1.00, W 18.00. Henry Disston & Sons, Inc., Philadelphia.

K-W
A special alloy steel. Carpenter Steel Co., Reading, Pa.

K-W
Water-hardening tungsten steel, for cold drawing dies, finishing tools, burnishing tools, etc. Has high cold resistance. Contains C 1.30, Mn 0.30, W 3.50, Si 0.45. Carpenter Steel Co., Reading, Pa.

L

LaBelle 89
A hot work steel, for gripper dies, flying shears, bolt trimmer ties, swaging dies, etc. Contains C 0.55, Cr 4.00, V 1.00, Mo 0.50. Crucible Steel Co. of America, New York.

LaBelle Extra
Extra carbon tool steel, for cold heading dies. Carbon as desired. Crucible Steel Co. of America, New York.

LaBelle Silicon No. 2
Alloy tool steel, for pneumatic chipping chisels, punches, shear blades, track chisels, hand chisels, etc. Contains C 0.60 Mn 0.80, Mo 0.30, Si 1.90. Crucible Steel Co. of America, New York.

LaBelle Special Hot Die
A hot work steel, for gripper dies for large forgings, header dies, die blocks, etc. Contains C 0.40, Cr 2.25, Ni 2.50. Crucible Steel Co. of America, New York.

LaBelle 2-70
Alloy tool steel, for backing-out punches, belt clippers, concrete breakers, hammers, hot sets, mauls, etc. Contains C 0.60, Mn 0.20, Si 2.00. Crucible Steel Co. of America, New York.

Lanark
Oil hardening or water hardening chisel steel, for chisels, punches, pneumatic tools, shear blades, stamps, etc. Contains C 0.55, Cr 0.15, Mn 0.90, V 0.25, Mo 1.30, Si 1.90. Latrobe Electric Steel Co., Latrobe, Pa.

Latrobe
A plain carbon steel. Vanadium-Alloys Steel Co., Latrobe, Pa.

LCT
A hot work steel, for punches, hot swaging dies, spike cutters, extrusion dies, coining dies, shear blades. Contains C 0.45, Cr 3.00, V 0.40, W 15.00. Crucible Steel Co. of America, New York.

L. C. T.
A tough oil-hardening or air-hardening steel, for hot work punches and dies. Contains C 0.45, Cr 3.00, V 0.40, W 15.00. Hawkridge Brothers Co., Boston; also, Halcomb Steel Co., Syracuse, N. Y.

LCT No. 2
A hot work steel, for brass forging dies, punches, dummy blocks, extrusion dies, forming rolls, spike dies. Contains C 0.45, Cr 3.00, V 0.40, W 11.50. Crucible Steel Co. of America, New York.

L.C.T. No. 2
An oil-hardening or air-hardening steel, for brass extrusion dies. Contains C 0.40, Cr 3.00, V 0.40, W 11.50. Hawkridge Brothers Co., Boston.

Leco
Non-tempering, water quenching steel for chisels, dies, drills, blacksmith tools, machine parts, pneumatic tools. Very tough, excellent resistance to fatigue, and has deep hardness. Contains C 0.33, Cr 0.75, Ni 0.30, Mn 0.40, Mo 0.75, Si 0.65, Cu 0.70, Ti 0.15. Lehigh Steel Co., New York.

Leco Extra
Non-tempering, oil quenching steel for dies, rivet sets, chisels, punches, cutters, machine parts, and pneumatic tools. Very tough, excellent resistance to fatigue and abrasion, and has deep hardness. Contains C 0.44, Cr 0.75, Ni 0.35, Mn 0.40, Mo 0.75, Si 0.65, Cu 0.70, Ti 0.15. Lehigh Steel Co., New York.

Lehigh Die—H Temper
An abrasion resistant die steel for dies, shear blades, etc., containing C 1.65, Cr 11.50, V 0.40, Mo 0.80, Si 0.35. Bethlehem Steel Co., Bethlehem, Pa.

Lehigh Die—L Temper
An abrasion resistant die steel for dies, shear blades, etc., containing C 0.85, Cr 11.50, Ni 1.05, V 0.30, Mo 0.45, Si 0.35. Bethlehem Steel Co., Bethlehem, Pa.

Lehigh Die—S Temper
An abrasion resistant die steel for dies, shear blades, etc., containing C 2.05, Cr 11.50, Ni 1.05, V 0.60, Si 0.35. Bethlehem Steel Co., Bethlehem, Pa.

Lehigh SS
High speed steel for lathe tools, drills, punches, dies, boring tools, etc. Has high wear resistance and maximum red hardness. Contains C 0.75, Cr 4.50, Mn 0.25, Co 12.00, V 2.00, W 20.00. Lehigh Steel Co., New York.

Lehigh XXX
High speed steel for lathe and planer tools, dies, punches, reamers, drills, etc. Has good red hardness and high toughness. Contains C 0.70, Cr 4.00, V 1.00, W 18.00. Lehigh Steel Co., New York.

Liberty
A water-hardening steel, for chaser and threading tools. Contains C 1.20, Cr 0.30, W 1.25. Hawkbridge Brothers Co., Boston.

Lion
A water hardening, intermediate grade of carbon tool steel suitable for general tool purposes. Contains C 1.00, Mn 0.30, Si 0.25. Jessop Steel Co., Washington, Pa.

Lion
A plain carbon steel. Edgar T. Ward's Sons Co., Pittsburgh.

Lion Extra
A water hardening, moderate price steel for drawing, forming and trimming dies, etc. Contains C 1.00, Mn 0.30, Si 0.25. Jessop Steel Co., Washington, Pa.

LLCT
A hot work steel, for piercing punches, gripper dies, extrusion dies. Contains C 0.25, Cr 4.00, V 0.40, Si 15.00. Crucible Steel Co. of America, New York.

LMW
Oil or air hardening. Mo-max type moly-tungsten, high speed, general purpose steel, for lathe, planer or boring tools. Combines good cutting quality with toughness. Contains C 0.80, Cr 4.00, V 1.00, W 1.50, Mo 8.00. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also, Edgcomb Steel Co., Philadelphia.

Lockport Special
An 18-4-2 type of high speed steel. Simonds Saw & Steel Co., Fitchburg, Mass.

Lophos
A special alloy steel, containing Mn, Cr and V. Ziv Steel & Wire Co., Chicago.

L. P. D.
Hot work, air or oil hardening steel, for hot forging dies. Has high toughness. Contains C 0.30, Cr 5.00, Mn 0.30, W 1.40, Mo 1.75, Si 0.90. Latrobe Electric Steel Co., Latrobe, Pa.

L. T. Forging
Hot work steel, for hot forming dies and punches, containing C 0.35, Cr 3.50, V 0.50, W 9.25. Firth-Sterling Steel Co., McKeesport, Pa.

L-35
Water hardening steel, for cold-heading dies. Is a specially processed steel. Contains C 0.90, Mn 0.40, V 0.35, Si 0.16. Darwin & Milner, Inc., Cleveland.

Ludlum 602
Silico-manganese-moly, water or oil hardening steel, for chisels and various pneumatic tools. Good resistance to shock with moderate hardness. Contains C 0.48, Mn 0.70, Mo 0.40, Si 1.70. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also, Edgcomb Steel Co., Philadelphia.

Lumdie
Air hardening die steel, for die casting dies, for aluminum and white metals. Has low distortion, and resists heat checking. Contains C 0.40, Cr 5.25, Mn 0.25, Co 0.50, W 4.50, Si 0.90. Latrobe Electric Steel Co., Latrobe, Pa.

LXX
An 18-4-1 high speed steel. Allegheny Ludlum Steel Corp., Pittsburgh.

LXX
An 18-4-1 high speed, air or oil hardening, general purpose steel, combining good cutting quality, toughness, resistance to decarburization and forgeability. Contains C 0.70, Cr 4.00, V 1.00, W 18.00. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also, Edgcomb Steel Co., Philadelphia.

M

Magic
An oil hardening steel. Will resist shock and retain its cutting edge under severe working conditions. Recommended for pneumatic and hand chisels, etc. Contains C 0.53, Mn 0.90, Mo 1.10, Si 1.95. Jessop Steel Co., Washington, Pa.

Malga
A special alloy steel. Amalgamated Steel Co., Cleveland.

Manganal
Manganese nickel tool steel with high impact and abrasion resistance. Contains C 0.80, Ni 3.0, Mn 13.0, Si 0.75. Stulz Sickles Co., Newark, N. J.

Mangano
Oil hardening non-deforming die steel, for blanking dies, broaches, cold forming dies, plug and ring gages, punches, etc. Contains C 0.95, Cr 0.20, Mn 1.50, Si 0.30. Latrobe Electric Steel Co., Latrobe, Pa.

Mangano Special
Oil hardening non-deforming die steel, for reamers, stamping dies, threading taps, thread rolling dies, trimming dies, etc. Contains C 0.90, Cr 0.50, Mn 1.20, W 0.50, Si 0.30. Latrobe Electric Steel Co., Latrobe, Pa.

Mansil
Non-deforming steel for dies and punches. Contains C 0.90, Cr 0.50, Mn 1.15, W 0.50. Henry Disston & Sons, Inc., Philadelphia.

Marathon
A wear resisting, oil-hardening or air-hardening steel, used chiefly for dies, tools and gages. Contains C 2.25, Cr 12.00, V 0.20, Mo 0.90. Hawkridge Brothers Co., Boston; also, Halcomb Steel Co., Syracuse, N. Y.

(TO BE CONTINUED NEXT WEEK)

New Equipment

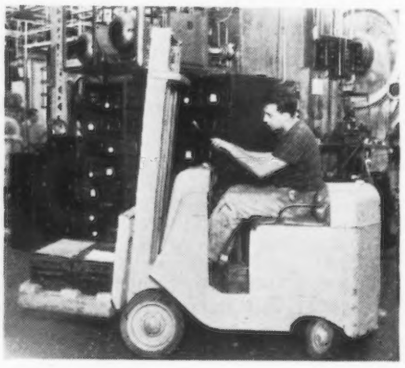
Material Handling Apparatus

Here are discussed some of the more recent advances in the design and manufacture of material handling trucks, boxes, pallets, cranes, hoists, conveyors, belting material, magnetic separators and auxiliaries.

LATEST addition to the line of industrial trucks manufactured by the *Baker Industrial Truck Division* of the Baker-Raulang Co., Cleveland, is the JOM center control fork truck in 2000 and 3000 lb. capacities, designed for operation in narrow aisles and congested areas. The compactness of this model, combined with the short turning axle, facilitates working in close quarters. Safety and speed of handling of materials are enhanced by operator's position and accommodation. Safety controller is interlocked with the driver's seat, so that the truck will move only when operator is seated. Positive control of hoisting and tilting is provided through oil-hydraulic cylinders. A motor driven gear pump supplies pressure through metering valves; lowering is by gravity. The 2000-lb. capacity truck handles loads up to 60 in. in length, while the 3000-lb. model takes loads up to 42 in. long. The standard simple lift is 72 in. and 119 in. the telescoping lift. The lightweight model is made of high tensile steel by welding and hot riveting. This truck is also built for heavier loads and the control apparatus is made particularly strong to withstand years of service.

All-Purpose Lift Truck

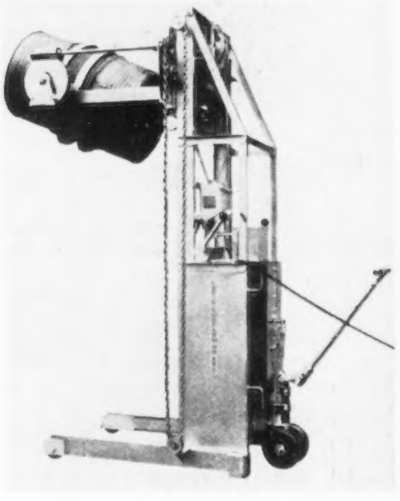
FOLLOWING the success of model LT-40 lift truck for loads up to 3000 lb., *Towmotor Co.*, 1228 East 152nd Street, Cleveland, has introduced a companion model, the LT-44, built along similar lines, but capable of lifting 4000 lb. at 15 in. from the carriage. The truck, with



a 44-in. wheelbase and a turning radius of 72 in., has an over-all width of 35 in. and over-all length of 74 in., without forks. Powered by a 27½-hp. four cylinder gasoline engine, the truck is said to travel at 1 to 10 miles per hour. The hydraulic lifting and tilting system will raise the rated load accurately to heights of 7, 9 and 11 ft., at the rate of approximately 40 ft. per min. Driver's position and location of controls, as well as accessibility of motor and transmission, are designed for maximum safety, convenience and simplicity in design.

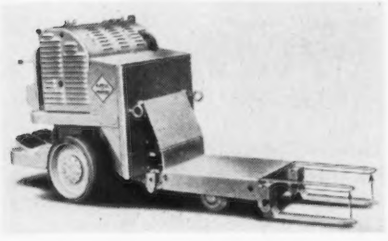
Drum Dumping Stacker

HANDLING of drums, barrels and other containers is facilitated by a new drum-dumping stacker of the *Lewis-Shepard Sales Corp.*, 245 Walnut Street, Watertown, Mass. Control from the floor through a self-locking worm makes possible the holding of the drum for as long as desired in any position and to tilt the drum or barrel to control the flow of material from the container. The versatility and efficiency of this unit make it a valuable help. This maker has further produced a transporting stacker for handling materials shipped or stored on double faced pallets. This is designed for manual operation in place of large electric or gas operated fork-type tiering trucks.



Low Lift Truck

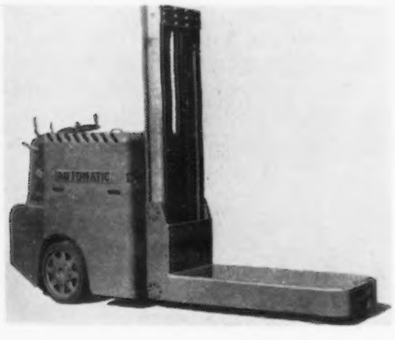
INDUSTRIAL trucks with low lift can be had from *Elwell-Parker Electric Co.*, Cleveland, featuring a special platform with removable forks. When attached to



the truck in low position, the 30-in. fork will lift and transport loaded pallets from floor level. The same fork extensions when inverted will pick up and transport long skid loads on the truck platform, which is 10¾ in. high and elevates to 16½ in., raising and lowering being effected through an independent motor and screw ram. The electric motor is protected in case of overload by a slip clutch. Dynamic braking can be obtained for ram operation.

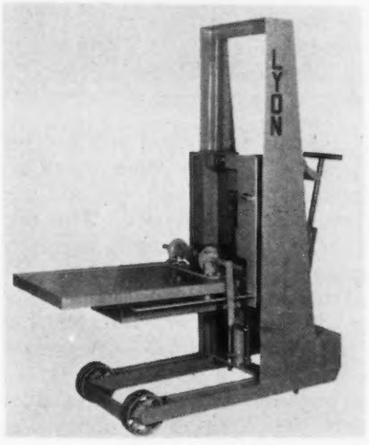
Heavy Platform Trucks

SPEEDIER 5-ton skid transportation and stacking are offered by new heavy-duty low and high-lift platform trucks produced by *Automatic Transportation Co.*, 121 West 87th Street, Chicago. This unit is fitted with fully magnetic contactor and lift control. The platform measures 60 x 26¼ in., is 11 in. high and will rise 5 in. on the low and 60 in. on the high lift platform. Roller chain hoist with triple-spur gear transmission is precision mounted in horizontal split housing. Heavy duty drive motors are fan cooled for top-travel performance. Steering connections are ball-bearing mounted with dirt-proof casings.



Truck with Hydraulic Table

UNIQUE design of hydraulic die handling truck has been introduced by the *Lyon Iron Works*, 693 Madison Street, N. Y. This truck has a table arranged to revolve with stops at each 90 deg. Table extends about 1 ft. beyond the edge of the wheels so that the table may be put close to the press when dies are mounted or removed, and it is equipped with a winch for handling the dies. The truck shown in illustration is of 1000 lb. capacity, has a table 24 x 36 in., 12 in. above the ground, with 39-in. elevation and a two-speed hydraulic



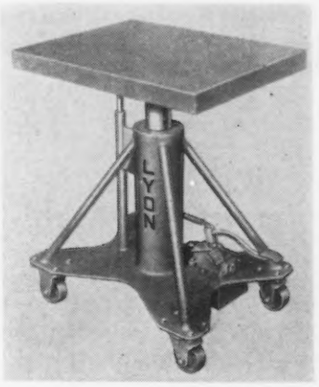
hand pump. Other capacities and specifications can be furnished also or equipped with a motor driven pump.

Pneumatic Tractor Tire

A PNEUMATIC rubber tire for use on industrial tractors has been announced by the B. F. Goodrich Co., Akron, Ohio. This industrial tractor type Silvertown is designed to equip the traction wheels of small farm type tractors which are now finding wide use in industry. It is available in two sizes, 8-24 and 9-24, and provides adequate traction for off- and on-the-road service, having an unusually thick tread strengthened with Duramin.

Hydraulic Elevating Table

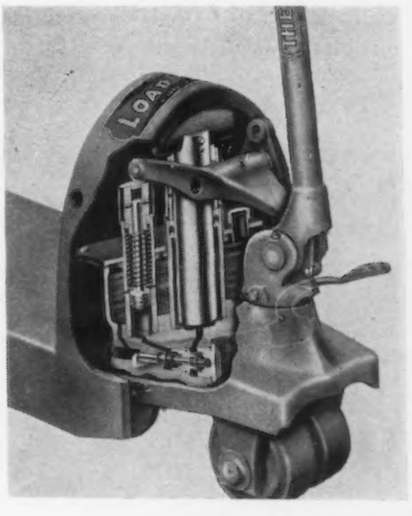
FOR the movement of dies in and out of presses, for the transfer of heavy parts from one machine to the other, and for use as a work table, the *Lyon Iron Works* produces a hydraulic elevating table. This is raised by short, easy strokes of a pedal and lowered by a release pedal. Casters at the extreme corners of the base give stability to the table, which is enhanced by table guides. Table measures 24



x 30 in., lowered height is 28 and raised 42 in. Of the casters, two are stationary and two are ball bearing swivels. The table weighs 350 lb. and has a capacity of 2000 lb.

Hydraulic Hand Lift Truck

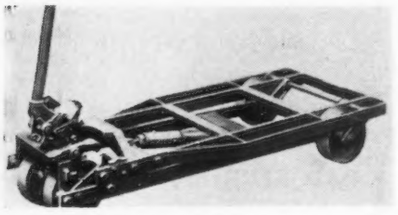
LOAD KING hydraulic truck is claimed by *Yale & Towne Mfg. Co.* to be the perfectly balanced hydraulic hand lift truck. It is built for continuous heavy-duty service in capacities from 3500 to 8000 lb. with easier lift and steer, greater safety, lower maintenance and controlled lowering of loads. The lifting unit is self-contained and totally enclosed. Pump unit is equipped with automotive type piston and piston rings, which guarantee maximum pressure. The strong hydraulic unit with a 5-pint oil reservoir requires less frequent



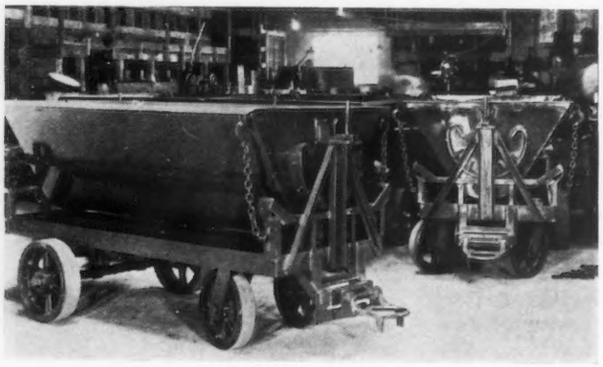
refilling and is guarded against shock and damage. Parts are all finished for accurate and permanent fitting. The one-piece frame serves both as elevating platform and frame. Large Timken thrust bearings on the steering column provide easy steering of heaviest loads. Wheels are steel with sealed ball bearings. Maneuverability is increased by 200-deg. lifting and steering.

Improved Hand Lift Trucks

SIMPLIFIED lift is featured in the improved Red Streak and Blue Streak hand lift trucks with 3500 and 2500 lb. capacity, respectively. The balanced handle lessens the lifting effort and flattens the lift curve of the shortened single stroke lift. The hand grip is larger to afford a better grip. It is welded



with the handle shaft and the lower handle casting into a single unit. The trucks have a full 180 deg. steer. Steel wheels are mounted on ball bearings sealed against dirt. Front head and steering column are steel castings assembled on a turntable with a hardened and ground thrust washer. On the Blue Streak model a counterbalanced load retaining hook grips a roller latch, holding the load in positive lock while elevated. This roller latch also permits trigger action release of load. The self-locking lift hook requires only the slightest pressure on the treadle to engage the lifting frame. Made by *Yale & Towne Mfg. Co.*, Philadelphia.



Explosion-proof Carriers

FOR PLANTS where the danger of explosion, fire or other hazards is considerable, Ernst "Magic" carriers are now fitted with wheels and locking attachments of copper silicon alloy.

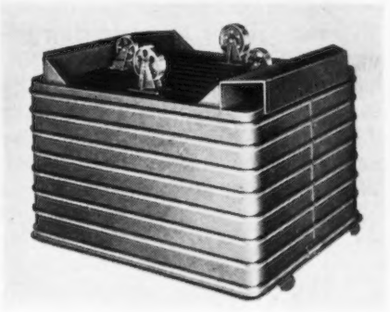
Wheels of this metal will not pick up nails, tacks or other spark-producing material and will not generate static electricity. The alloy is noted for its strength, corrosion- and spark-resisting qualities. The carriers are made in three models by *Charles K. Ernst, Inc.*, 999 East Ferry Street, Buffalo. The standard model will handle all types of barrels and drums, having a capacity up to 55 gals. Interchangeability and interlocking give it the widest use also for handling wire or boxes, etc.

Heavy Dump Truck

DESIGN and performance of the new dump truck made by *Service Caster & Truck Co.*, 511 Brownswood Avenue, Albion, Mich., make it suitable for the handling of coal, small castings, scrap, etc. The outstanding feature is the maneuverability due to large 19-in. casters with rubber tires and Timken bearings. The truck is 85⅜ in. long and 36 in. wide and has a capacity of 1¼ cu.yd. Hopper can be made watertight, if oils, chemicals or other liquids are to be conveyed. The same firm has brought out a new warehouse truck equipped with a brake. It is of very sturdy construction and its maple wood deck measures 36 x 72 in.

Tiering Dump Box

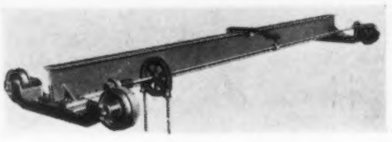
CORRUGATED steel box, designed especially for use with lift trucks equipped with revolving type forks, has been introduced by the *Union Metal Mfg. Co.*, Canton, Ohio, for handling scrap, small metal parts, etc. Special fork pockets are welded to the bottom at either end and run the full length of the box. When forks are inserted in these two pockets, the box can be lifted, turned over and righted again. Top flange can be equipped with tiering or crane lugs for efficient storage and handling. Casters facilitate short spottings. This firm also produces an improved all-steel light weight pallet which is intended to be used as returnable package in shipping materials. The top deck and legs are formed in one piece and the num-



ber of channel spacer supports depends upon the width and load. A return bottom flange adds further strength and protects the floor. Gages of metal and size are adapted to customer's needs. Also double-faced pallets can be supplied.

Bridge Crane Assembly

BUDGIT knock-down bridge crane assembly consists of all parts required to build a top running, geared type traveling crane bridge, except I-beam and shaft. All parts are attached to the I-beam without doing field drilling or machine work of any kind. From this crane assembly the bridge crane as shown is built in one hour's time. *Shaw-Box Crane & Hoist Division;* Manning, Maxwell & Moore, Inc., Muskegon, Mich., also produce the Budgit swinging bracket jib



crane assembly, consisting of all parts required to build a jib crane, except the I-beam, and furthermore, the Budgit underhung bridge crane assembly.

Lifting Clamp

IMPROVED style of safety lifting clamp, equipped with a replaceable, grooved hardened steel jaw liner is announced by the *Never-Slip Safety Clamp Co.*, P. O.

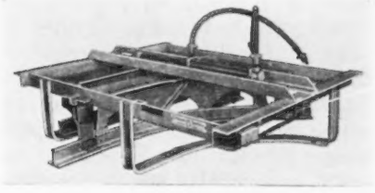
Box No. 448, Grand Central Annex, New York. These clamps, made for either horizontal or vertical lifting of steel plates, sheets or sections, are available in 10 styles for handling material weighing up to 12 tons, and from $\frac{1}{8}$ to 6 in. in thickness. The replaceable jaw liner greatly extends the life of the clamp as well as contributes to its lifting power and holding ability.

New Cranes

AFTER exhaustive tests, *Northern Engineering Works*, Detroit, has announced a new line of cranes: types S.A. and L.S.A. Some of the features in this new line are: horizontally split hoist gear housing, splash lubricated hoist gearing and bearings; removable safety type mechanical brake; standard foot mounted ball bearing motors, and safety type crane wiring construction. Controls are arranged for either cab or floor operation. Throughout the construction welding is used extensively to provide a rigid structure and maximum strength.

Switch for Cranes

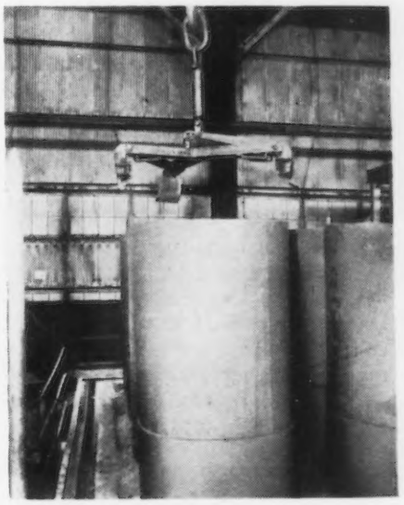
AIR-OPERATED switch has been developed by the *Cleveland Crane & Engineering Co.*, Wickliffe, Ohio, for use on cab-operated, gravity, or automatic dispatch overhead monorail handling systems up to 5-ton capacity. The tramrail operator can preset the switch while traveling and thus save time. Likewise, indexes on gravity or automatic dispatch carriers may be set to actuate trippers which will cause one or several switches to take the desired positions. The welded steel switch consists of two main assemblies, an outer supporting frame and an inner sliding frame. The outer



frame is bolted rigidly to the superstructure. The inner assembly, carrying a straight and a curved rail, rides on multiple, easy operating rollers and is set in operation by an air cylinder.

Lifting Tongs

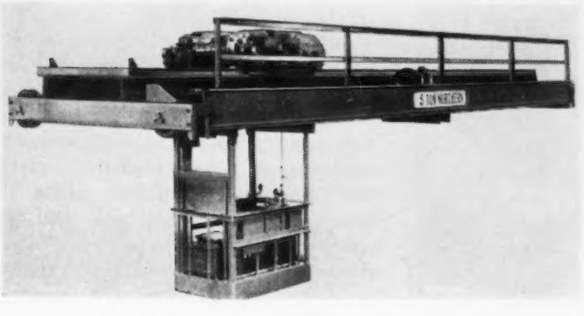
AUTOMATIC Safe-T-Tongs have been designed by *Heppenstall Co.*, Pittsburgh, for one of the large steel mills to lift annealing covers from stacks of steel in coils. Made of Ni-Cr-Mo steel, these tongs eliminate the necessity

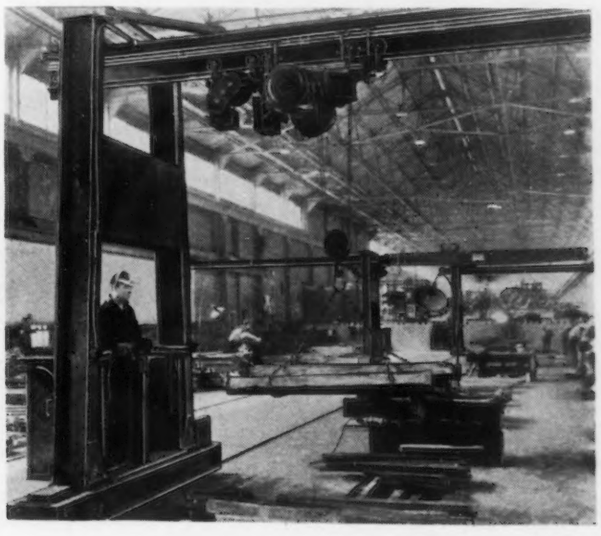


of placing chains or hooks on the hot covers. It is only necessary to lower the tongs on the work, and hereafter the job is almost automatic. Lifting capacities run as high as 200,000 lb. The tongs are time saving and reduce hazards.

Gantry Cranes

HEAVY duty gantry cranes provide auxiliary service beneath a box type mill crane. These gantries, produced by the *American Monorail Co.*, 13107 Athens Avenue, Cleveland, operate at 100 ft.





per min. from dual drives, from the conventional steel wheel on the floor rail and from the Monotractor rubber wheel on the wall rail. On the crane bridge is shown an electric hoist which is propelled by a spur type Monotractor for horizontal movement. This carrier unit operates at 350 ft. per min., controls for all movement being located in the gantry cab. The capacity of the crane illustrated is 2 tons. Similar equipment can be furnished to handle loads up to 5 tons.

Light Hoist

ELECTRIC wire rope hoist for flexible handling service in all lines of industry is announced by the *Harnischfeger Corp.*, Milwaukee. This P & H Zip-Lift is light enough to be carried and can be mounted either rigidly or on hook or trolley. It operates with push-

buttons, and is powered from an ordinary light circuit. This hoist is fitted with double brakes for safety and automatic limit switch to prevent loads from rising too high. Fully enclosed construction makes the unit impervious to dust, fumes, acid and weather. The lift permits a wide latitude of side pull and can be pulled along a trolley by means of the cable itself. It is useful for handling baskets of parts for pickling or heat treating and can be used to operate oven doors, raise lids, etc. Capacity ranges from 250 to 2000 lb.

Electric Hoist

LIGHT-WEIGHT, portable, plug-in type Comet electric hoists have had a 1-ton capacity model added to their line which now comprises a capacity range from 250 to 2000 lb. It is rugged and compact in design and suitable for all

types of hoisting service. Lift is available with hook suspension or with a trolley attached for overhead conveyance. Special heavy-duty, high torque motors are supplied for either 110 volt lighting service or 220 and 440 volt power lines. Hoist is precision-built throughout with permanently lubricated ball bearings at all rotating points. The load brake is smooth and quick-acting, and an emergency brake with upper and lower limits guards against abuse and insures safety. This unit is made by the *Chisholm-Moore Hoist Corp.*, Tonawanda, N. Y.

Lifting Magnet

TO accelerate loading and unloading operations, *Cutler-Hammer, Inc.*, Milwaukee, now announces a new 77-in. lifting magnet,

which is claimed to be the world's largest. The first of the new magnets was installed on the Great Lakes freighter O. S. McFarland. For comparison a 65-in. C-H magnet was used and it was found that the new magnet would lift about twice the amount of material.

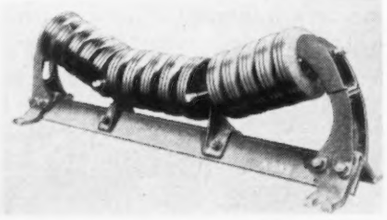
Plant Locomotive

TRACTIVE force of 26,000 lb. is supplied by a new locomotive which is designed to take a curve of 50 ft. radius. There are models using from 30 in. to normal gage track, 7 ft. 4 in. wide, 10 ft. 6 in. high and 22 ft. 10 in. long, bumper to bumper. The four driving wheels are 42 in. in diameter. This unit is

of the saddle tank type, with boiler 56 in. in diameter, designed for a working pressure of 180 lb. per sq. in. and uses bituminous coal. Heavy slab steel frame is annealed to insure ruggedness and perfect alinement. Cab is constructed of sheet steel, with clear wire glass windows. This locomotive, weighing 118,000 lb., is produced by the *H. K. Porter Co., Inc.*, 4948 Harrison Street, Pittsburgh.

Impact Absorbers for Conveyors

STYLE No. 711 pneumatic impact carriers are designed for use under loading spouts and in belt feeders where the impact of heavy bulk loads subjects conveyor belt and carrier to abnormal strains and wear. To cushion the impact,



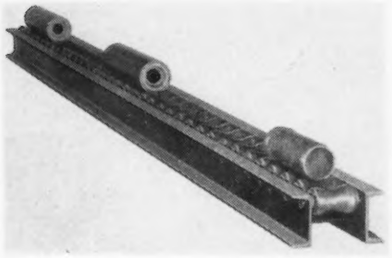
the rollers in these carriers are made up of a series of 6-in. diameter pneumatic rubber units of wear resisting material, inflated and permanently sealed. The rollers are mounted on a steel hub in which bearings and shaft are housed.

Made by the *Stephens-Adamson Mfg. Co.*, Aurora, Ill.

Also the *Link-Belt Co.*, Indianapolis, announces a new troughing type rubber-tread impact idler, designed to absorb the shock of receiving heavy, lumpy, rough materials at the loading point. The idlers are available for belt widths 14 to 60 in. and consist of 6-in. diameter molded rubber rolls. They are said to cushion even the heaviest blows.

Roller Conveyor

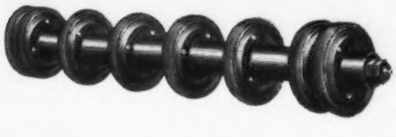
CONCAVE roller conveyor was designed by *Standard Conveyor Co.*, North St. Paul, Minn., for handling shells or cylindrical objects up to 6 in. diameter between machine operations. The rollers are formed from 2¼ in., No. 10 gage tubing, and ends are reduced in size and reamed to form a seat for the bearings without any



separate hubs or cages. Hexagon through shafts serve the dual purpose of locking the bearing to the shaft and the shaft in the frame. This arrangement prevents turning and undue wear and also insures uniformity at roller carrying surface even after long service.

Return Idler for Conveyors

DEVELOPMENT and manufacture of a new line of rubber-tread idlers for supporting the return run of 14 to 60 in. wide belt conveyors, is announced by *Link-Belt Co.*, 220 South Belmont Avenue, Indianapolis. Each idler consists of from four to twelve 6-in. diameter rubber-tired rolls, mounted on a roller-bearing-equipped steel tube that will fit into the same supporting hangers as the regular return idler. Rolls have two extruded rubber tire half sections clamped between steel disks in order to facilitate replacement.



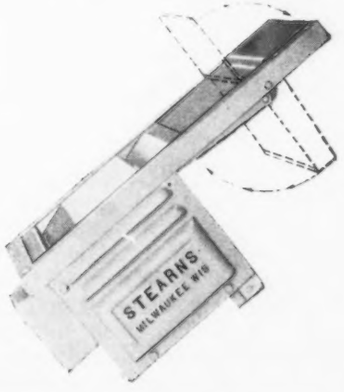
Conveyor Belt Material

HOMOCORD, a conveyor belt material which is claimed to combine the flexibility of cord with the ability to hold metal fasteners, together with increased life and tonnage capacity, has been introduced by the *Manhattan Rubber Mfg. Division*, Passaic, N. J. A new type of cord was developed for conveyor use. These belts are said to meet every demand by correct proportioning of lengthwise and crosswise strength and flexibility, low inelastic stretch, resistance to fatigue and impact, and equal life

in body and cover. Drawbar strength and resistance to fatigue to hold metal fasteners are said to compare well with the conventional fabric conveyor belt.

Improved Magnetic Separators

MODERNIZED and simplified spout type magnetic separators, Super Class AA, of the *Stearn Magnetic Mfg. Co.*, Milwaukee, now operate with fewer parts and provide a more powerful magnetic field than heretofore. The magnet coils are protected by aluminum plates provided with spacious louvers to allow maximum



ventilation and protect against dirt and dust. A toggle plate opens and closes the safety gate automatically as the current is switched on or off. A new type rectifier is fitted for a.c. operation, and is less susceptible to damage by dust, dirt or atmospheric conditions. These magnets are furnished in sizes for 8 to 10 in. wide and operate from 110 to 220 volt a.c. or d.c.

Drum Type Separator

FOR the reclaiming of babbitt from oily chips and turnings left from a rod broaching operation, the *Stearns Magnetic Mfg. Co.* has designed an unusual variation of the drum type L magnetic separator. In this unit an arrangement of riffles was designed into an elongated spout between the hopper and magnetic drum. The metal and babbitt scrap is thereby efficiently disintegrated before being passed over the magnetic drum where the powerful magnetic field makes possible separation and reclamation of the babbitt. The separator is equipped with a self-contained motor-generator unit with the necessary control. Sep-

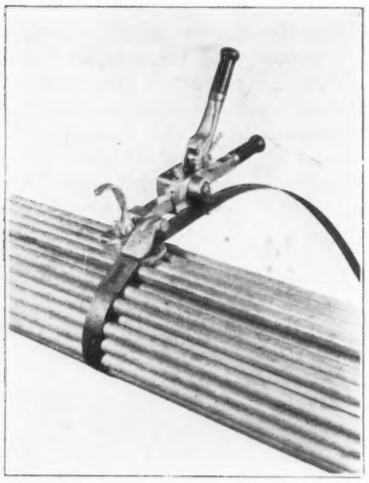
arating mechanism is completely enclosed. Unit can be equipped with casters for moving about where necessary.

Strapping Tool

STRETCHING tool for steel strapping with a new gripper action principle has just been made available by *Signode Steel Strapping Co.*, 2600 North Western Avenue, Chicago. In this tool the gripper jaws are located in the bottom of the front base of the tool and the strap is gripped at the edges, so that the foot or base of the stretcher is not under the strap in the tensioning operation. With

this new stretcher, straps of wide or heavy gage can be applied to small bundles of steel rounds and other compressible commodities with considerable firmness. Slack is eliminated, since there is no stretcher foot under the strap. It is manufactured in two sizes.

This maker has also introduced a special steel strapping, called Anchor Strapping, for car door



bracing solid carloads of cartoned, bagged and loose bulk commodities. Strapping is fabricated with centered holes, making for faster and easier application.

Conveyor Belt

ENTIRELY new type of conveyor belt for specialized coke wharf service is announced by the *B. F. Goodrich Co.*, Akron, Ohio. The belt's construction provides a double thickness of cover over the areas of greatest wear on both top and bottom of the belt, so that when abrasion wears it down, the belt can be turned over and additional service can be obtained from the untouched cover area. The cover is made of a compound which provides exceptional resistance to aging as well as abrasion.

Feeder and Conveyor

VIBRATING conveyor has been designed by *Standard Conveyor Transmission Equipment Co.*, 416 West Eighth Street, Los Angeles. This unit operates on the lift-throw principle, imparting to the conveyod material a gentle forward motion through oscillating arms. Self-alining precision ball bearings are used throughout and the arms are mounted in rubber bushings. By adjustment of the rate of oscillation the volume handled can be controlled and material can be conveyed up inclines of 15 deg.

Improved Crane

LIMA LOCOMOTIVE WORKS, INC., Shovel and Crane Division, Lima, Ohio, is now furnishing the ¾ yard Paymaster crane with a special generator attachment for magnet operation to handle scrap iron, ingots, etc. Weight of the machine has been reduced and stability increased by the use of modern steels and by placing the main machinery at the extreme rear of the revolving frame. The swing clutches are of the internal expanding band type, toggle operated, and their unusual size assures smooth and accurate control. Anti-friction bearings at all vital points greatly increase efficiency. The boom hoist in this machine is a separate unit, mounted on the rotating base casting and is independent in operation.

Improved Lifting Magnet

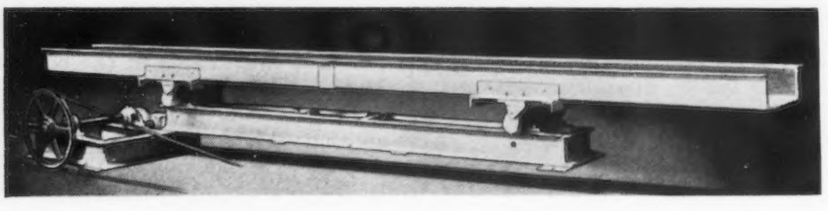
RECENTLY a new super-strength lifting magnet has been developed by the *Ohio Electric Mfg. Co.*, 5900 Maurice Avenue, Cleveland. This magnet is produced in sizes of 55 and 65 in. diameter and the manufacturer claims that it not only has double the lifting power of other magnets of similar size, but that due to the incorporation of an insulating layer of Johns-Manville Super-Ex bricks, the unit is well able to deal with work at elevated temperatures without being compelled to go through cooling off periods. The 65 in., 13,700 lb. model lifted 3100 lb. of plate trimmings, 5400 lb. of plate scrap, four 9000 lb. raw steel sheet coils and billets weighing up to 12,000 lb. and as hot as 800 deg. F.

Concrete Patching Material

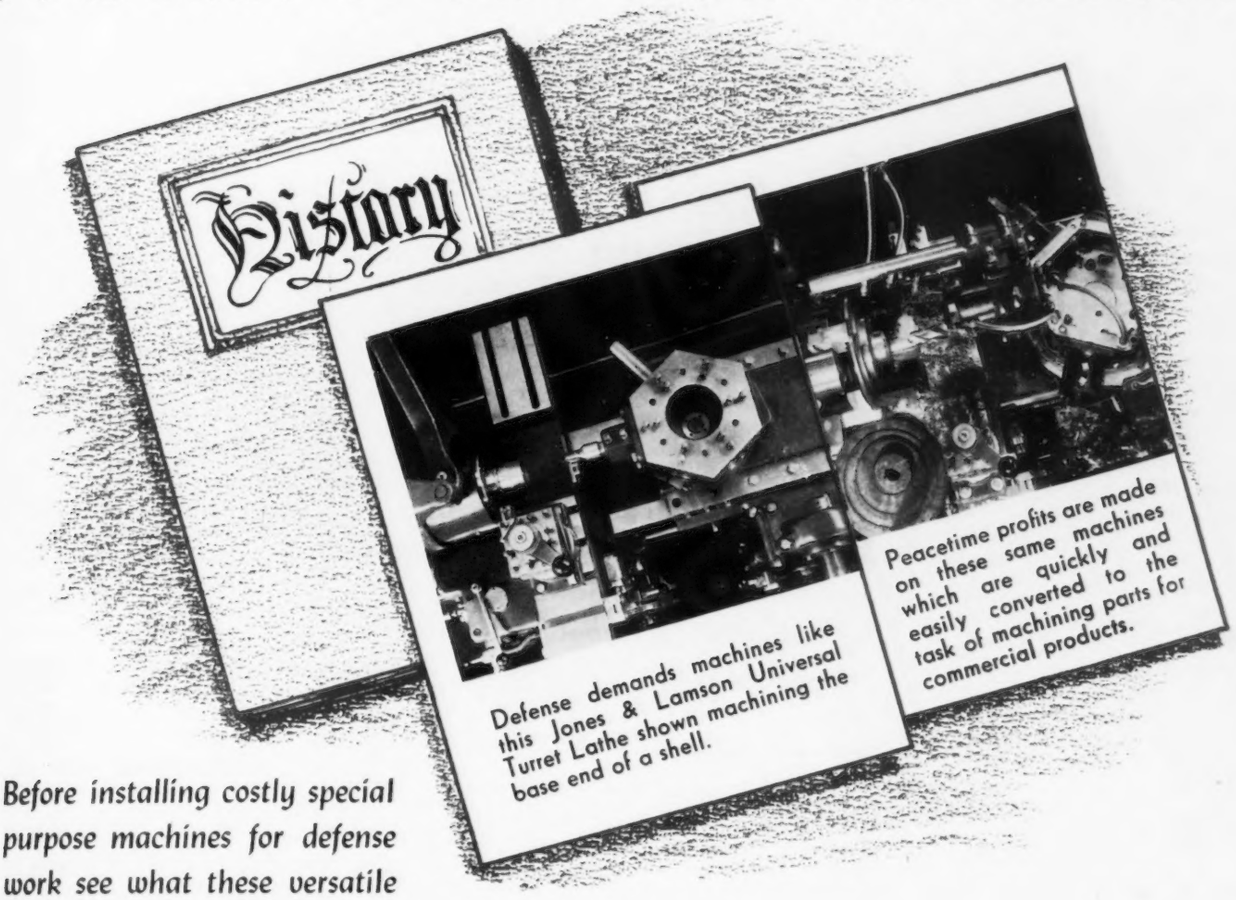
PATCHING holes, spalls and joints in concrete is made easy by the new Quick Patch material of the *Dura-Tred Co.*, Dept. F, 3508 Carrol Avenue, Chicago. The maker claims that this ready-mixed compound will reduce patching to a one-minute operation and will make patching possible without interruption of plant operation. Truck traffic is said to improve the setting. This material provides a low traction, permanent floor repair both inside and out of doors.

New Counting Mechanism

TODAY the electric eye is solving manifold industrial problems. *Durant Mfg. Co.*, 1945-C North Buffum Street, Milwaukee, employs the photo-electric cell and beam projector with its recently perfected magnetic Productimeter. The set is especially adapted for counting objects of odd shapes and sizes, small and light objects and articles whose finish must not be impaired by the counting process. The counter has a speed of 500 counts per min, and is available in 5- or 6-figure capacity. It operates from a light circuit of 110 or 220 volts, 60 cycles.



. . a leaf or two from this book:


History
Defense demands machines like this Jones & Lamson Universal Turret Lathe shown machining the base end of a shell.
Peacetime profits are made on these same machines which are quickly and easily converted to the task of machining parts for commercial products.

Before installing costly special purpose machines for defense work see what these versatile Jones & Lamson Machines can do for you.

HISTORY'S lessons show us clearly that it pays to look ahead — not merely one step ahead — but a step beyond that. Today everyone agrees our first step is to arm — and arm at once. Versatile, rigid, precise and highly productive Jones & Lamson equipment will speed our defenses — and tomorrow, when this emergency is over, your same Jones & Lamson machines will enable you to take the next logical step — toward sound peacetime profits based on rock bottom production costs.

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MACHINE TOOLS

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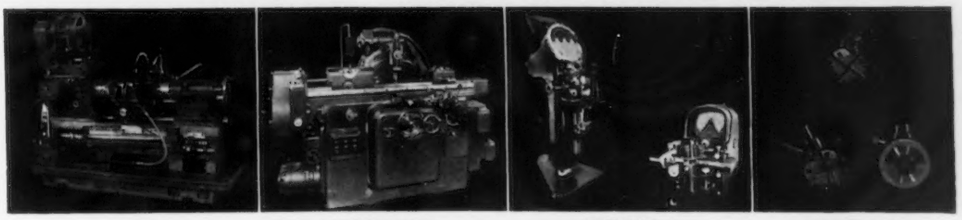

FAY AUTOMATIC LATHES | AUTOMATIC THREAD GRINDERS | OPTICAL COMPARATORS | AUTOMATIC OPENING DIE HEADS

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• 78% of man-hours needed in bomber construction program will come from automotive plants . . . New 6-sided hydraulic press expected to set new record in production of sheet metal airplane parts.

DETROIT — In terms of man-hours of work, the greater percentage of effort in the building of bombers will be that emanating from the automobile industry, which will contribute some 78 per cent of the total effort involved in the bomber construction. Naturally, Detroit has developed a keen interest in everything labeled aviation and is sizing up each new development in aircraft manufacturing in terms of its possible application here. Therefore there is much interest in the new multiple-sided hydraulic press which is going into the Long Beach plant of Douglas.

This new equipment is a six-sided Bliss hydraulic press whose output is expected to break production records. It will be used to cut and form sheet metal airplane parts, using the Guerin process with rubber mats and lead dies. Because of the multiple-side feature, it is expected to rival the speed of mechanical presses in the automobile industry. Two of these presses are being provided by Bliss. They will have 2500 tons pressure capacity and will weigh approximately 375,000 lbs. each, stand 25 ft. high, and occupy an area of about 32 ft. in diameter.

The press is constructed with six posts and six radiating die slides, automatically controlled to eliminate the need for a master operator and avoid danger of mis-operation because of human error. Any one of the die slides can be moved into the press independently of its relation to the preceding slide. This has the advantage of permitting the "ready" die slide to be put into place for pressing and stamping operations without regard to operating the die slides in sequence.

The multiple-side press has the advantage of permitting a larger number of men to load work and there is adequate space between die slides for workmen and material.

Since the slides enter radially to the work station and occupy different relative positions within the press bed, the rubber pad must be rotated accordingly. This is accomplished automatically and simultaneously as the die slide enters the press.

Can Exert Different Pressures

A feature of this new press is its ability to exert different pressures on the various die slides, each being provided with its own pressure adjustment. If a light pressure is desired on one pad and a heavy on another, they may be pre-selected. The press has variable speed, so the punch descends rapidly to the work and slows to actual forming speed at a pre-determined point in its traverse. When desired pressure is obtained on the work, the press automatically reverses and returns to the upper position, and the die slide travels out automatically.

This Douglas equipment is so designed that the desired slide may be pre-selected by pushing the starting button, even while the previous operation is being performed.

Among the automobile plants that are now in the initial stages of fabricating aluminum for aircraft assemblies, there has been considerable experimentation with mechanical dies and mechanical presses in place of the rubber pad, lead dies, and hydraulic presses that are common in the aircraft industry. (The aircraft industry also uses a large number of rope drop hammers, but the auto industry hasn't even considered using this technique.)

There were lots of headaches involved, but it is evident from recent trips through auto production plants that the auto industry is finding it possible to use mechanical dies with considerable success. Sample parts are shown to be much truer and smoother, with sharper breaks at corners when they are formed on mechanical dies. Parts produced with rubber pads and lead dies do not present the same sharp corners, where corners are desired, and they have a more "wavy" appearance.

Production speeds have not been very high so far on aluminum, however. The principal reason for this has been the inability to obtain enough material to make any production runs of extensive length.

Scarceness of Metal a Factor

This, it appears, was one of the big errors in early assumptions that the automobile industry would simply take a coil of aluminum strip, start one end of it through a punch press, and pick the parts up in a basket at the other side. It is not possible to run thousands and thousands of identical parts because the aluminum is not available in such quantities. Instead, it has been necessary on occasion to set up the new cast-iron or steel dies, run a few dozen pieces and then make a new set-up to run some other kind of piece. Until enough material becomes available to permit stamping plants to make long production runs, the highly touted efficiency of the automobile industry will not have a chance to make a showing.

Another problem has been that of buying material to exact size, as is done in the automobile industry. For instance, here it is the practice to estimate blank sizes very carefully in purchasing steel for automotive

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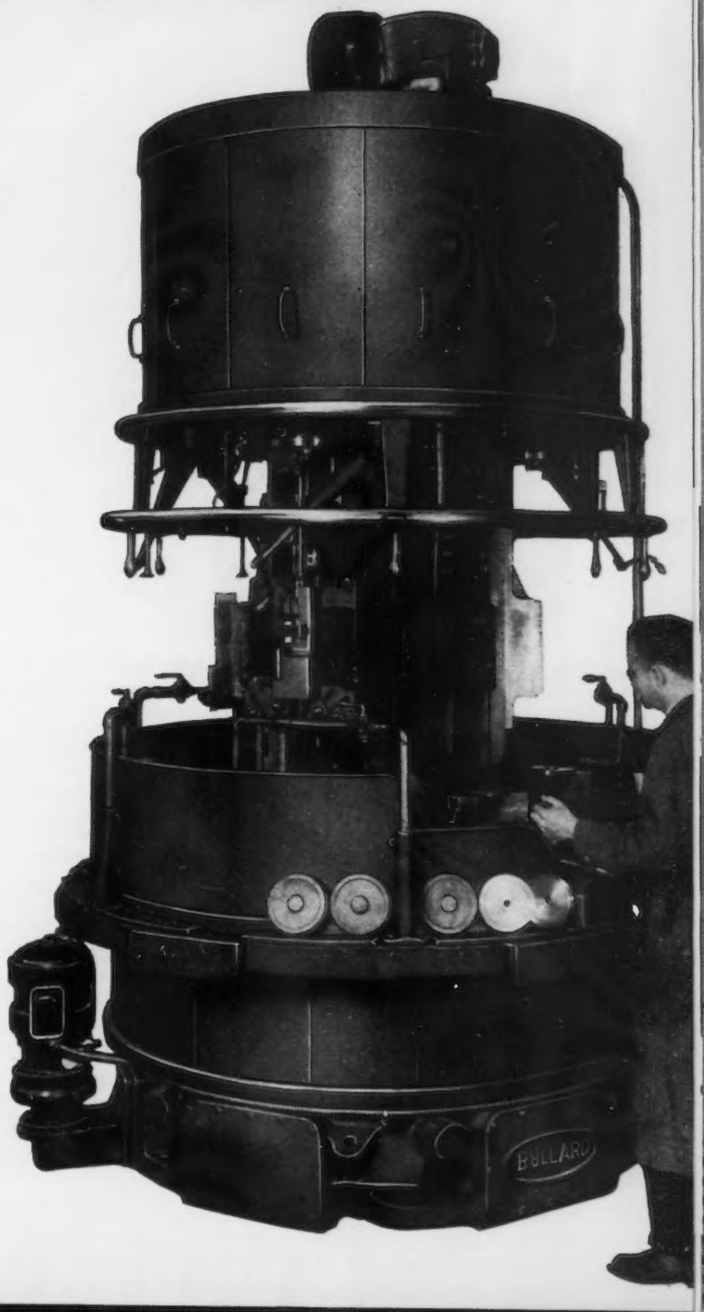
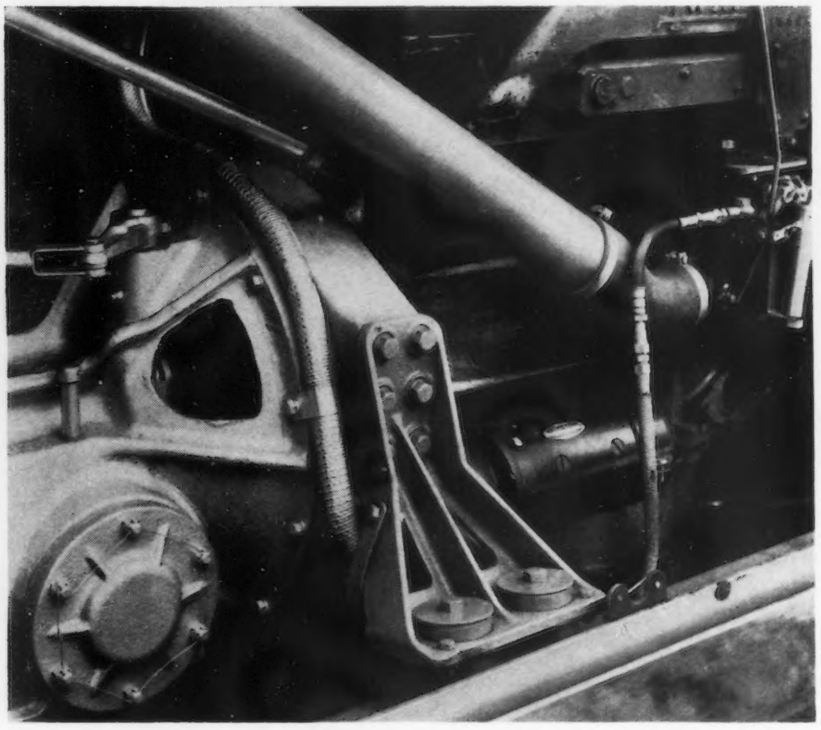
Bullard Machine Tools are daily helping hundreds of manufacturers to attain the production time necessary to meet defense needs — they can help you, too.



THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

stampings, and have the material pretty close to size when it is first shipped. After production is underway and a few thousand stampings have been made, engineers determine just how close to size they can operate and then change sheet specifications so they get steel cut almost exactly to size. In the aircraft industry it has been impossible to do this and, even today, one plant in Detroit is buying 96-in. sheets to make 58-in. panels. The offal is being stored, pending the time when this plant has an order for small parts so it can make use of this material.



FLEXIBLY MOUNTED BUS ENGINE: One of the first applications of flexibly mounting a bus engine which is positioned at right angles to the drive shaft is in this Twin Coach Bus which employs Lord vertical snubbing bonded rubber shear type mountings. This particular installation required use of eight mountings, each supporting a 310-lb. load. The Twin Coach Co. reports this type of motor suspension isolates engine vibrations and the vertical snubbing feature protects the engine from road shock. Metal snubbing washers on the top and bottom of each mounting, coming into contact with snubbing shoulders on both ends of each mounting, introduces a compressive stress in the rubber which is directly opposed to the actuating shock force.

Problem Will Continue

The possibility of buying aluminum alloy sheets to exact size will probably continue to be limited until volume becomes great enough to warrant handling special orders of this sort, because it would obviously be pretty difficult to arrange for special size sheets when the quantities are distinctly limited as at present.

The story of the first year of successful operation of the electromotive (GM) Diesel freight locomotive is now being told in a booklet, "83,000 Miles." This new locomotive has hauled its loads in below-zero temperature and across deserts at 115 deg.; also at all altitudes from sea level to 10,000 ft., demonstrating that the extremes of heat, cold and altitude have no appreciable effect upon its performance. This locomotive was engaged in test runs on 20 railroads throughout the country during the year.

For some 68,000 miles the Diesel was operated as a single 5400-hp. locomotive. Then it was split in two and operated for 15,000 miles as two 2700-hp. locomotives. The tests were undertaken to demonstrate the efficiency of these locomotives, and careful records were kept to show the improved average speed over rolling or mountainous profiles and to demonstrate the greater hauling capacity, compared with conventional railroad equipment.

Auto, Rail Industries Linked

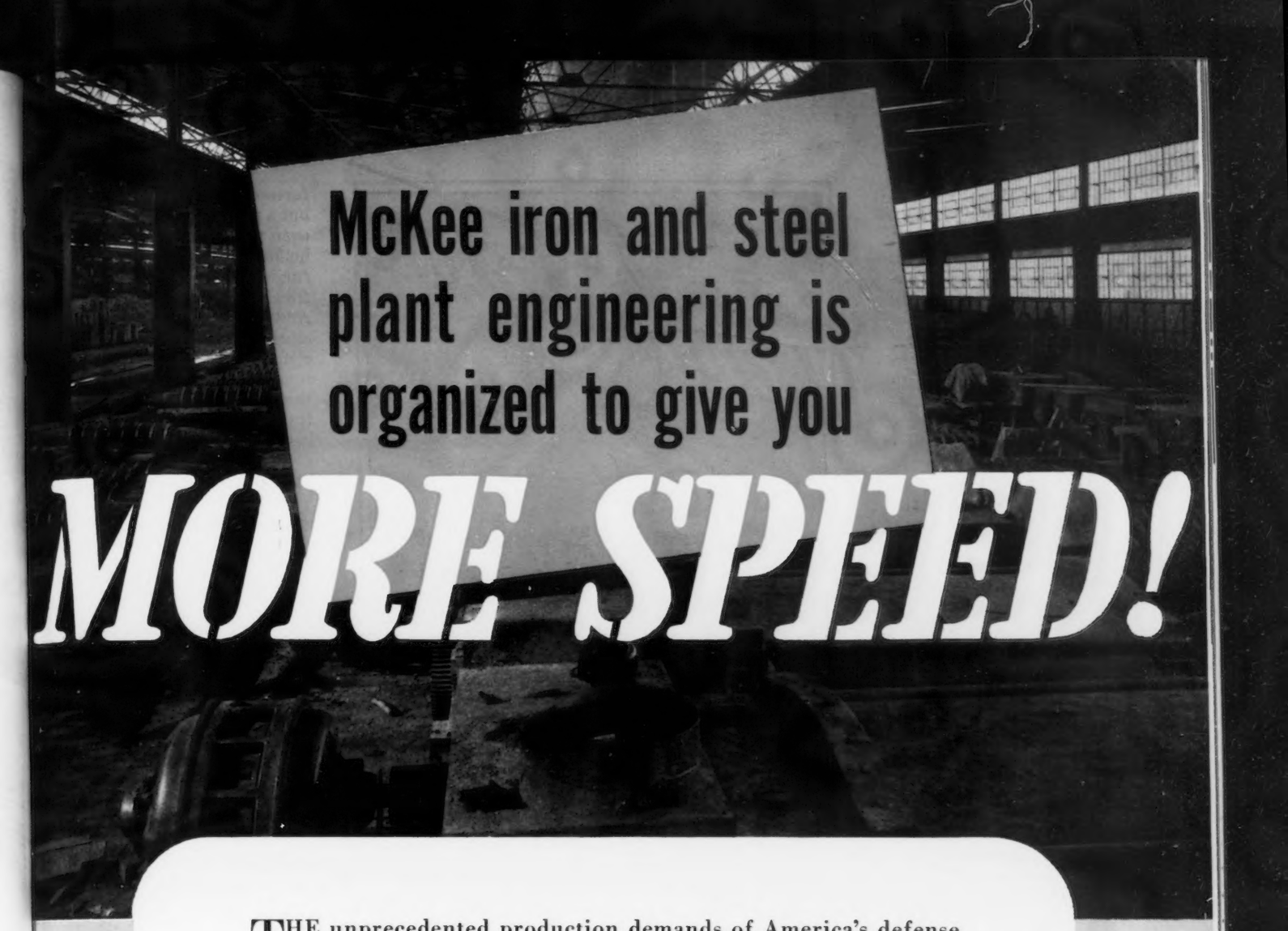
Such factors as the development of the diesel locomotive and lightweight, streamlined cars have been important in changing outlook and affiliations in the automotive and railroad industries. For instance, the Society of Automotive Engineers now naturally embraces the railroad field wherever these types of problems come up, and it is the close relationship between diesel power and automotive equipment that has put General Motors in the locomotive building field.

The problem of operating industry solely with older men and rejected draftees is becoming a serious one, according to Dr. Kenneth E. Markuson, director of the Bureau of Industrial Hygiene of the state health department in Michigan. He spoke at the formal opening of the new medical building at the Pontiac plant, and his audience included 159 members of the Oakland County Medical Society.

Manpower Biggest Problem

"Your greatest problem will not be increased production, material shortages, or strikes, but the need for more and more manpower," Dr. Markuson declared. "Young men have been drafted and industry must fall back on older workers and the rejects of the Selective Service Act. In fairness to all, these men should be given as stiff a physical examination as the Army gives. This should be made before employment, because these men are defective and should be placed where their defects are not a menace. The Army is rejecting 40 per cent of the draftees, and these are going into industry."

Automobile production totals were only 106,395 units in the past week chiefly because the Memorial Day holiday caused a loss in production time, according to Ward's Reports, Inc. This was a substantial decrease from the previous week's 133,560, but was far above last year's 60,980.



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This is familiar ground to McKee engineers. With over thirty-six years of practical experience, the McKee organization can save time in many ways in the completion of your project.

McKee activities in the iron and steel industry in the past few years are extremely valuable to you today. Much of the design for modern plants recently completed by us can be duplicated in your project. Material can be ordered long before detailed engineering is completed thereby reducing delivery delays to a minimum.

The construction of your project moves smoothly and rapidly to completion in the hands of men who have had long experience in working together as an organization. This method of operating entirely within our own organization prevents duplication of effort and eliminates lost motion and delay.

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Washington

BY L. W. MOFFETT
Washington Editor

• Real, not verbal, butter must now be sacrificed for defense . . . Industry wants government to take responsibility for resisting excessive civilian demands for tonnage . . . So far economy in non-defense items is merely talk.

WASHINGTON—Now that President Roosevelt has proclaimed that "an unlimited national emergency" exists, meaning that he believes war to be imminent, the butter should be sacrificed in reality rather than verbally. Serious dislocations though there will be to the peacetime economy, civilian demands will have to be shunted further into the background and industry placed on a widespread gun basis. Industry itself now has arrived at the point where it wants OPM to dispense with half-hearted control and apply rigid control, including hard-and-fast application of mandatory priorities on steel and other basic products. Industry wants the government to take responsibility for resisting excessive civilian demands for tonnage, so that industry can get along unhampered with war production.

OPM has been hesitant about turning to this drastic step. But the fact is the country faces war. Indeed, except for certain formalities it is at war, and in this modern "civilization" aggressor nations fly at the throats of victims without bothering about the outmoded formalities. Hence, OPM will do well to take over at once and for the period of the emergency proceed with OPACS and other national defense government organizations and regiment industry. What this may imply after the emergency in the way of tightened government control or socialization may well cause apprehension, yet that is not the immediate problem.

The immediate problem is to mobilize the resources of the country to their fullest efficiency and this can't be done unless the government, management and labor actually work closely together, each prepared to make sacrifices which have been small so far as industry is concerned, and entirely absent so far as government and labor are concerned. Government spokesmen get red in the face and become hysterical lashing out at the "complacency" of industry toward defense and beat their breasts madly trying to make industry war conscious.

Politicians Look After Selves

Yet just what sacrifices has the government made that would inspire war consciousness? Safe from the dangers of the war zones, politicians who favor an all-out war, boil over because they think or affect to think industry is not wholeheartedly sold on the war issue. Yet they vote differently. Their political hides are given precedence over national defense. They lose their war consciousness where their own little selfish interests are at stake. They vote millions for farmers that are nothing but a political grab, made even more odious by the hollow pretense that the funds are made available for the defense. The Administration, so excited about the country's complacency over defense, signs the bill and thereby leads the country to wonder if all this rampaging about complacency, apathy and so on is really sincere.

Talk, but talk only, is engaged in about economy, but non-defense appropriations are jacked up rather than cut. While the farm "loan" bill with its scandalous waste is passed under pressure from a powerful political group, the necessity of price control to avoid inflation is urged and with good logic, yet the politicians who frantically call upon others for sacrifices take good care to feather their own nests. They either sponsor or condone political extravagances of all sorts that fly directly in the face of principles they expound to avoid inflation and to keep prices under control. It's an ex parte control, where the political repercussion is not serious. Rightly industrial price rises have been checked. Wrongly legislation is passed under the whip of the farm bloc that means higher costs of living with nothing more than idle gestures at control.

But Unions Cash In

Labor runs wild and cashes in richly on the defense program because nothing is earnestly done to halt it. It has lately been orally admonished by the President, but until it is brought into line to cooperate with capital in the defense program there will be skepticism over concern about "complacency" of the country toward defense. The politicians will have to undergo sacrifices they so loudly urge upon others and then will have to forego Treasury grabs before faith in their expressions can be established. Then this much-desired unity will be present and the defense program will move forward much faster on all fronts.

↓ ↓ ↓

• • • **OPM Director** of Priorities E. R. Stettinius, Jr., announced that 58,000 lb. of aluminum will be allocated to light-plane manufacturers for June and an equal amount for July, with 11 manufacturers sharing in the June quota. Mr. Stettinius said that the action in restricting aluminum supplies is designed to facilitate the production of light airplanes for the civilian pilot training program.

Specific allotments of aluminum have been arranged

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At the time the picture was taken, Lou was grinding a taper of 3½″ per foot on an attachment driving gear. That's a steep taper, but all sizes of CINCINNATI Hydraulic Universals can handle it. Among other features of versatility may be listed the Hinged Internal Grinding Attachment. It can be set up in less time than it takes to talk about it—merely swing it down, tighten in place with one hinged bolt, and it's ready to go. Tarry at each end of the table traverse may be independently adjusted. Automatic reversal with pick feed engaged may be set as short as 3/32″, producing an automatic plunge cut effect.

Other features that develop *better grinding in your toolroom* are described in a booklet bearing that title, G-455. Write for your copy today

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for in accordance with recommendations made to the Priorities Division by the Civil Aeronautics Administration. Manufacturers covered by the order may apply for an A-10 rating which will permit them to get the amount of aluminum designated from their suppliers. Each manufacturer will place his own orders with aluminum suppliers, but these orders will be subject to check by the Priorities Division, in order to make sure that the allotments are not being exceeded.

Bomber Sections to Be Made By Chrysler Corp.

Washington

• • • **A $5,336,835** educational order has been placed by the War Department with Chrysler Corp., Detroit, for manufacture of air frames, nose and center fuselage sections for medium bombers.

Scrap Inventories Lower, U. S. Reports

Washington

• • • **Reflecting a decline** of 8 per cent, domestic stocks of iron and steel scrap at consumers' and suppliers' plants and in transit at the end of March, 1941, approximated 7,235,000 net tons compared with 7,843,000 tons at the end of 1940, according to the Bureau of Mines.

Stocks of pig iron showed a decline to 2,608,000 tons from 3,138,000 tons. Scrap consumption last March totaled 5,171,000 net tons, 8 per cent above December, 1940, and at an annual rate of 68 per cent above 1939. Consumption of pig iron in March of the present year amounted to 4,645,000 tons compared with 4,484,000 tons in December.

Known stocks of scrap held by consumers and suppliers at the end of the first quarter were equivalent to a six-weeks' supply at the rate of consumption in March, a position slightly lower than that at the end of the year when available stocks were equivalent to a seven-weeks' supply. Thus, while suppliers' stocks on March 31 amounted to 2,015,000 tons compared with 2,191,000 tons at the end of December, consumers' stocks were 5,220,000 tons and 5,652,000 tons, respectively.

Inventories held by larger suppliers reporting in both canvasses declined 7 per cent, with railroad stocks decreasing 17 per cent. In western Pennsylvania reported stocks of purchased and home scrap were equivalent to at least a four-weeks' supply at the estimated rate of consumption in March.

The district comprising eastern Ohio and West Virginia had a five-weeks' supply and other principal scrap-consuming districts had from a five-to-six-weeks' supply available. Inventories in the New England and western States were equivalent to a supply for 18 and 15 weeks, respectively, while the southwestern States had sufficient scrap to last 61 weeks. The estimate of consumers' stocks is based on the assumption that companies reporting their inventories held 95 per cent of the total stocks on hand at consumers' plants.

Photo by Harris & Ewing

MORE GUNS, MORE TANKS: Some of the responsibility for carrying out President Roosevelt's plan that nothing be allowed to interfere with production of arms for the U. S. and the other democracies rests on the shoulders of this man, H. A. Millis, (above), chairman of the NLRB.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WELL, THE OLD PLACE AIN'T CHANGED MUCH
IT'S GOOD TO SEE YOU BOYS BACK-- REMINDS ME OF THE OLD DAYS
THEY CAN'T TRAIN MEN FAST ENOUGH FOR THIS WAR WORK, SO THEY'RE HAVIN' TO INDUCE A BUNCH OF THE OLD RETIRED MACHINISTS BACK TO PUT SOME PEP INTO THE PROGRAM!
I DON'T THINK THEY HAD TO DO MUCH INDUCIN'-- I'LL BET THE OLD BOY WITH TH' VALET WENT UP FROM A MACHINIST TO A BANKER AND IS NOW GOING UP FROM A BANKER TO A MACHINIST!
THE CRINOLINE SQUAD
J.R.WILLIAMS
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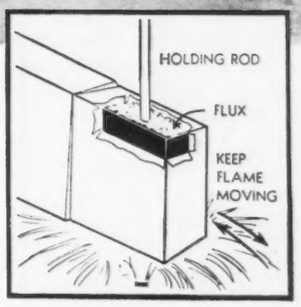
Illustrated above are a few of the many Carboloy tools used by a well-known brass goods manufacturer. They range from complicated forms to the most simple types. All are regularly made in their own shop. The method is simple, economical, fast!

Complete instructions on how to make your own Carboloy tools are contained in our Engineering Bulletin GT-116 available upon request, without obligation. Investigate this "short-cut to speed-up."—Write for your copy today.



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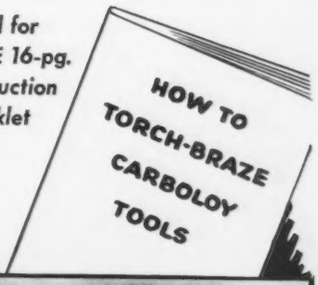

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TUNGSTEN CARBIDES

ON THE WEST COAST

FULL national emergency, insofar as West Coast industry is concerned, finds its chief significance in the power given the President to direct the Maritime Commission to requisition any vessels required for government defense needs.

Six months ago shipping men would have interpreted such a declaration of power as an augury of a wholesale shift of ships to Navy authority. Today, however, a more temperate view is found in most quarters. Ship owners, cognizant of the potential power of the Maritime Commission, have shown a readiness to cooperate in shifting their vessels to any directed use or shipping route. With the Maritime Commission having direct control over most new constructions, and with an obedient attitude on the part of private owners, requisition would only bring unnecessary dislocation and confusion.

The net outlook for non-defense metal consumers seems to be for increased all-rail shipments — and this goes for emergency defense customers, too. Some intercoastal runs may continue for a time, but continued blood transfusions to interocean commerce are bound to weaken intercoastal trade until it is a very minor factor.

Some talk of gasoline rationing has hit the coast, which will prove a boon to oil companies preparing for the vacation trade. Other cries of wolf have been more successful in gaining the ear of industry, and this particular animal will have to ring the doorbell again before he gets much attention.

Power shortage has no place among the worries of those who wonder how aluminum production is going to keep pace with the swelling plane production program, insofar as the coast production program is concerned. A statistical pearl for the airsters lies

• OPM consultant recommends new steel capacity for Coast . . . Requisition of ships unlikely with shippers ready to cooperate . . . Bonneville-Grand Coulee dams could create enough power to make Aluminum for 200,000 planes, statisticians say.

in the potential combined generating capacity of Bonneville and Grand Coulee Dams which could provide power to produce enough aluminum to build over 200,000 planes annually. Although this amazing estimate does not bear the stamp of scientific accurcay, it is arrived at in this way: Bonneville and Grand Coulee Dams, when they reach their full generating capacity, will generate 2,462,000 kilowatts annually. The new Aluminum Company of America plant at Vancouver, Wash., will reach a full annual capacity of 150,000,000 lb. aluminum on a contract demand of 162,500 kilowatts of Bonneville-Grand Coulee power. To furnish a spring board for our statistical dive, estimate that five tons of aluminum are required for an average plane, which may be a belly-flop as an accurate estimate but certainly will get us in the water. Thus, 2,462,400 kilowatts of power can be translated into well over 200,000 planes. This wild figure has no relation to ore transportation problems, proposed reduction capacity, or plane manufacturing capacity, but it does serve to emphasize the tremendous potential generating capacities of dams which are already built.

Present generating capacity of the Bonneville-Grand Coulee system is rated at 214,400 kilowatts. This includes four generators at Bonneville and two small station service generators at Grand Coulee. Of this total, the Aluminum Co. of America plant near Vancouver, Wash., has been taking approximately 130,000 kilowatts for its four production units. This month the company's fifth unit will be in production and will require an additional initial delivery of 27,000 kilowatts. This additional delivery for the fifth unit will be gradually stepped up until the Aluminum company is taking 162,500 kilowatts, which is the demand specified in its three contracts with the Bonneville Power Administration. This agency sells power for both dams.

In addition to the Alcoa power supply, deliveries will begin some time in July or early August to the R. S. Reynolds Metals Co. plant now under construction at Longview, Wash. The contract demand of the Reynolds Company will be 60,000 kilowatts.

Generating capacity of the Bonneville-Grand Coulee system will be increased during the month of August by 162,000 kilowatts. This power will be produced by generator number Five at Bonneville and the first of 18 large generators at Grand Coulee. The Bonneville generator will have a capacity of 54,000 kilowatts and the Grand Coulee generator will have a capacity of 108,000 kilowatts.

In September, 1941, a second 108,000 kilowatt generator will be in operation at Grand Coulee. In January, 1942, a third of similar capacity will be in operation and generator number Six with a 54,000 kilowatt capacity, will be in operation at Bonneville. This means that in January, 1942, the combined capacity at both dams will total 646,400 kilowatts, produced by three full sized genera-

tors and two service generators at Grand Coulee and six units at Bonneville.

Present power sale commitments are 302,280 kilowatts.

Funds for the purchase and installation of units Seven to Ten at Bonneville have been approved, and foundation and turbine work at the Bonneville powerhouse is now under way. Bonneville will attain its ultimate capacity of 518,400 kilowatts in 1943. The Bureau of Reclamation, which has charge of construction at Grand Coulee, is expediting plans for the installation of additional generators there as rapidly as possible. Ultimate combined generating capacity for Bonneville and Grand Coulee dams will be 2,462,400 kilowatts, as previously stated.

The Bonneville Power Administration has scheduled its transmission construction program to keep up with generator installations. At present the powerhouses of the two dams are connected by a 235-mile, 230,000-volt transmission line across the State of Washington. Power is brought to the West Coast from Bonneville by two 230,000-volt circuits between Bonneville dam and Vancouver, Wash., in the Portland area. From Vancouver a 230,000-volt line runs north to inter-tie connections with the city light systems of Seattle and Tacoma. Another 230,000-volt line, 183 miles long, which will connect Grand Coulee directly with the Puget Sound area, is now under construction and is scheduled for completion within a year. When complete this line will close a 230,000-volt loop which will tie into both dams, Seattle, Tacoma and other Puget Sound centers. This loop is tapped by a 115,000-volt twin circuit into the Portland area and by the extension of one of these circuits into the populous Willamette valley in western Oregon. Present plans also include construction during the fiscal year 1942 of additional circuits between Bonneville and Portland.

Whether or not plant construction can keep pace is another problem. The Aluminum Co. of America has taken only 15 months from ground breaking in March, 1940, to reach its present annual capacity of 150,000,000 lb. When the Reynolds Metals Co. signed its first contract with the Bonneville Administration Feb. 24 of this year, it was specified that delivery of 40,000 kilowatts should commence June 15. This date apparently has proved a bit optimistic if it was intended to mark the start of operations, and the plant is now scheduled for completion "sometime during the summeh." Under a supplementary agreement, which specifies as 20,000 kilowatts additional for Reynolds, deliveries are scheduled to start Oct. 15. At any rate, as most plants are operating at capacity some time this fall, enough aluminum will be produced for 21,000 planes annually were it all devoted to this purpose—which, of course, it will not be.

Despite the failure of the Bonneville Administration to convince the steel industry of the economic feasibility of electric furnace ore reduction, and despite the lack of results from one widely ballyhooed unit of this type, further independent attempts may be expected. Whether or not the Administration's steel making ambitions are ever realized, it cannot be denied that the Bonneville industrial rate of 2.5 mills per kilowatt hour, the lowest blanket rate of this type in the country, constitutes an extremely attractive lure to industries requiring large quantities of electrical power. This rate constitutes powerful competition for the Tennessee Valley Authority rate of 3.4 mills per kilowatt hour, and tends to offset whatever advantage the latter agency may have in being nearer to large marketing centers. Both of these agencies may be undercut if present attempts to have the Boulder Dam rate lowered are successful. At any rate, competition in the power business is not dead, government ownership or not.

Although a strike by Local 683 of the CIO United Automobile Workers has apparently been averted by the Defense Mediation Board, all is not pacific among the 11,000 employees of the North American Aviation Co. at Inglewood, Cal. Even though the strike is averted for good, the demands of the CIO union were so extreme as to leave a very bad taste. Although the AFL received most of the publicity in the daily press, blame for the San Francisco Bay shipbuilding strike should be shared at least equally by the CIO. The work tied up by the CIO in the East Bay yards was even more important than that in the San Francisco yards which the AFL struck. The voice of Sidney Hillman denouncing the AFL in the northern California strike did not sound like the coo of the dove of labor peace. In fact, a San Francisco employer negotiator was heard to say a few good words for Madam Perkins last week.

Hauck Urges New Coast Steel Capacity

• • • **A minimum expansion** of 1,115,200 tons of ingot capacity on the West Coast was recommended by W. A. Hauck, OPM steel consultant, in the second Gano Dunn report on the steel industry, which was delivered to President Roosevelt last week.

The need of this added capacity was ascribed to the necessity of making the West Coast independent of Eastern supplies on account of the vulnerability of the Panama Canal and the possible congestion of transcontinental railroads. A secondary consideration was that such an expansion would draw its ore supplies from Utah and Wyoming and thus would not make additional demands on the already "heavily loaded Great Lakes Transportation systems."

Mr. Hauck's recommendation was based on a recent survey of the Pacific Coast which took into consideration such factors as sources of coal and ore, as well as markets and transportation facilities.

Mr. Dunn said that it was "conservative to assume that 500,000 tons of Mr. Hauck's recommendation may be undertaken in the form of additions to capacities of existing steel companies that now have plants on the Pacific Coast. No mention was made of the recent proposal of Henry J. Kaiser to build a string of West Coast steel plants to cost $150,000,000.

Among the proposed expansions for 1942 listed in the Dunn report was 89,000 tons of electric furnace capacity for Pacific States Steel Co.

(Turn to page 87 for more details on Gano Dunn steel report.)

Fatigue Cracks

BY A.H.DIX

He Threw in an "L"

• • • The best national defense slogan we have seen so far is this one in the Youngstown Sheet & Tube Company's employees' magazine, *The Bulletin*, edited by Al Greco:

DON'T LET THEM CATCH US
WITH OUR PLANTS DOWN

They Believe in Signs

• • • A man after our own heart is Ernie Pyle, Scripps-Howard columnist, who says his efficiency would be reduced 50 per cent if he had to work in a plant plastered with inspirational signs—"*Think!*" "*Do It Now,*" and so on. We can conceive of nothing more likely to scare away a fleeting creative thought than the cold command to "*Think!*" This is like saying to a comedian, "*I hear you're supposed to be funny. Crack a joke,*" or like a mother saying to her child, "*You'll love momma or get the hell whaled out of you.*"

It may be, of course, that we over-estimate the damage done by inspirational slogans. While they are new, their irritating power is high, but within three or four days the healthy mind builds up a protective mental callous against them, which is all to the good, for the signs make the brass hats happy while hardly harming the hired help.

They Didn't Believe in Signs

• • • Speaking of signs, C. S. Baur, your favorite family journal's v.p. and g.m., tells us that a sign on a London building reading, "*Anyone damaging this building will be prosecuted,*" was hurled across the street by a bomb explosion, breaking windows and otherwise defacing the building there.

And you may recall that ironical flash in "G. W. t. W.," showing a sign on a Southern plantation reading, "*Anyone damaging this property will be prosecuted to the full extent of the law,*" and a flash of the same sign after Sherman's march to the sea, showing the sign itself intact but the plantation completely destroyed.

Invitation

And then there's this sign that Ray Kay, your contact man in southern California, reports seeing on a Los Angeles movie house marquee, announcing a double feature:

COME LIVE WITH ME
I'M STILL ALIVE

$11,000 at a Clip

We have never bought a battleship, so we can read without batting an eye the news that the guvment has sunk 90 millions in a new battleship or made some other expenditure measured in light years. But what rocks us on our O'Sullivans is an item like this in the Government Awards section:

To William C. Ballantyne, Washington, D. C., an order for clips, paper, wire $11,562

We have bought paper clips—at 22c. a thousand, and are awed by the thought that the Government now owns some 60 million paper clips, enough, if butt welded, to reach from here to Dakar and back to the Cape Verde islands. Even allowing for wastage caused by clip shooting on dull days in regimental headquarters it looks like a bull market for paper manufacturers.

He Wants a Summary

You could make The Iron Age more valuable to readers by giving a summary on the front page of the leading articles in that issue. The main difficulty we find with your magazine is that by the time we get through all the advertisements in the front and back we miss the main articles in which we are interested.

E. A. Anderson, General Manager, Southern Saw Service, Inc., Atlanta, Ga.

We could, of course, plead with our advertisers to prepare less enticing messages. We might even set up certain standards and refuse to accept any advertisement likely to draw attention away from the main show provided by the brains department.

But our affection for the summary idea is tepid. We were hot for it back in the '20s when the idea was quite new. We went for it in a big way, printing the summary of the issue on heavy, shiny paper in several colors, and spending a lot of time preparing it each week. We kept it up for some six or seven years, but it really never was a success. Reader reaction was feeble and tests revealed that it was not pulling its weight.

We are sympathetic toward time-saving devices and in particular toward the desire to absorb vitamins of business information in tabloid rather than solid form. But in preparing a summary page too much is lost in the process of reduction. The reader is at the mercy of the summarizer. Faced with the problem of boiling some 70 pages of information down to a single page, he must necessarily eliminate much, and the danger is that he may pass by just that bit of information that is of greatest value to the reader.

But the chief danger is that the news summary page caters to the weakness of the reader who convinces himself that he is too busy to keep in touch with developments in his industry. The news summary gives his conscience an easy out. He can spend 20 or 30 seconds reading that and then toss the magazine aside with the righteous feeling of having done his duty for the week.

We prefer to tell you what is in the major articles through the medium of comprehensive sub-headings, and by captioning the shorter articles and items so clearly that you can tell at a glance whether they are something you should read.

Realist

• • • We reported to you recently that if you wish to impress Army people, you don't say "10,000 *shells.*" You say "10,000 *shell.*"

"*To be realistic,*" writes E. R. Armstrong, of F. O. Schoedinger, Columbus, Ohio, "*why not drop the other 's'?*"

Caption Critic

On page 83 of your May 15 issue you have a photograph captioned "Dawn in Georgia." I can't tell whether the scene is a sunrise or sunset, and don't know whether you really mean "dawn," or whether your southern accent is playing tricks.

—W. E. Fremont, Duluth, Minn.

We really meant dawn as in daybreak, not as in "Way dawn South in the land of cotton," but to avoid confusion we will settle for "Dusk in Georgia."

Puzzles

Last week's ship was 28 years old, and the boiler was 21. Speaking of ships, Lt. Comdr. Alston R. Simpson of the Office of Supervisor of Shipbuilding, U.S.N., Newport News, Va., says we were wrong in stating the odds on your picking the four American League winners of any one day. We reported that the odds are 16 to 1. But the Lt. Comdr. says:

It is true that if the bettor started off with one dollar and picked all the winners, he would collect sixteen dollars, but this includes his original one dollar bet, so that his winnings are $15, and the true odds are 15 to 1.

According to our puzzle book 16 to 1 are the true odds, and therefore A, who puts up one dollar, should demand that B put up $16, and if A guesses right he should collect the whole $17.

If you solve this in 20 minutes your I.Q. is definitely stratospheric:

A chipmunk is sitting on a log 10 feet long and 3 feet in circumference. As the log rolls downhill, a distance of 50 feet, the chipmunk goes from one end of the log to the other, always remaining on top. How far does the chipmunk travel?

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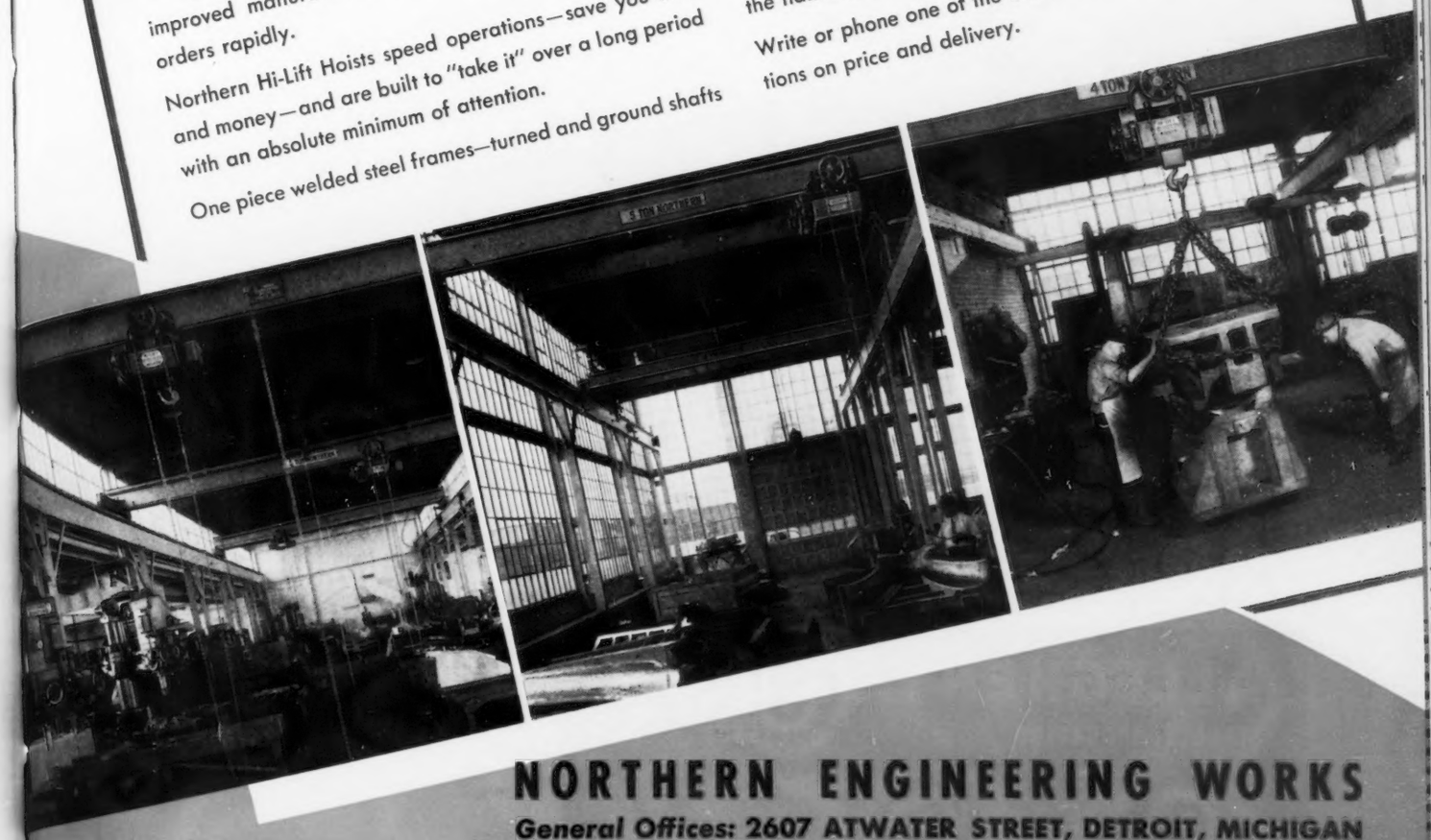

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(1) "New Process" Die Steel:
Special steel developed to meet the severe service conditions encountered when cold heading bolts, screws, rivets, nails, buttons and other small metal parts is described and illustrated in a new 8-p. bulletin. Photomicrographs, typical applications and complete information on the heat treatment of this "New Process" steel are included. *Jessop Steel Co.*

(2) Conveyor Belt Applications:
Chain link and flat link Cyclone metal conveyor belts used in many types of labor-saving equipment are discussed in catalog 1938. Features illustrated are: Flexibility, porosity, cleanliness, immersibility and resistance to heat. Visual aids for determining size of mesh for each purpose through diagrams and tables are shown. *United States Steel Corp.*

(3) Gas Welding and Cutting:
Equipment for gas welding and cutting operations, including scarfing torches, flame turning torches, welding torches, welding tips, regulators, acetylene generators, pre-heating torches and other welding aids, is the subject of new 43-p. bulletin. Diagrams and tables are used to summarize combustion process and prices of parts are quoted. *Harris Calorific Co.*

(4) Gun Barrel Rifling:
Close-up views of gun barrel rifling machine designed to meet modern requirements of speed and accuracy are shown in folder. Feed mechanism advances hook cutter after each complete revolution of gun barrel. Each spindle unit is complete in itself and may be run independently of the other. Specifications for range, speeds and feeds, floor space, weights and motors are listed. *Pratt & Whitney Division, Niles-Bement-Pond Co.*

(5) Core Making and Ovens:
Fundamentals of core making and how to produce better cores faster are discussed in new booklet. Illustrations and diagrams of new cross flow core oven which is said to provide faster baking, uniform cores and greater fuel economy are included. A new convected air cross flow heating, air circulating and recirculating system is offered which is easy to install to existing ovens and new ovens and is suitable for all types of heating *Despatch Oven Co.*

(6) Portable Electric Tools:
Electric handsaw with multiple thread worm and gear wheel for accurate and smooth performance, crucible steel blades and patented arbor mounting said to eliminate loss of speed is described in addition to portable electric drills and sanders. Outstanding features are listed and models illustrated. *Skilsaw, Inc.*

(7) General Purpose Hoists:
General purpose hoists are the subject of new 37-p. booklet. Five models cover hoisting range of from 1 to 5 tons. Each unit in line can be made to take care of more complex work by adding one or two drums and slewing attachment. Use of steel shapes and electric welding eliminates excess weight while insuring greater strength and dependability. *American Hoist & Derrick Co.*

(8) Spraying Cork Compounds:
Insulmat No. 595, a spray-on plastic compound containing special treated cork particles, is discussed in folder. When sprayed on any clean metal ceiling or other surface where temperature variation causes condensation, this substance is said to eliminate drip. Numerous tests made at Purdue University showed that a ⅛ in. coating is sufficient to prevent drip and that it is non-inflammable in its wet stage. *J. W. Mortell Co.*

(9) Composite Steel Dies:
Some of the advantages of electric welded composite steel die sections listed in folder are: Tool steel cutting edge backed by non-hardenable soft steel; expensive lapping operations eliminated; secure fit of sections on die shoes, and screw and dowel holes easily drilled after machining and hardening operations. Price tables and illustrations of dimensions and shapes available are included. *Forging & Casting Corp.*

(10) Roll Formers and Cutters:
Metal working equipment for steel mills, automotive factories, aircraft industry, structural shops and sheet metal workers are described and illustrated in booklet. Roll forming and cut-off equipment, tube mills and other miscellaneous and special equipment are among those shown. *Yoder Co.*

(11) Non-Metallic Bearings:
Non-metallic, anti-frictional, resilient and chemically inert bearings made of special cotton duck impregnated with phenolic resin are featured in new folder. Since they require only water for lubrication there is a continuous saving of the cost of lubricating oil. Stern tube bearings, the largest bearing on a ship, are also discussed. These are said to reduce power consumption, give longer service and are of segment design to support the shaft. *American Brakeblok Division, American Brake Shoe & Foundry Co.*

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(12) Neutralized Atmosphere Furnace:

Heat treating furnaces in which furnace gases are neutralized by a cartridge of Lithco compound are illustrated and described in this bulletin. Moving parts eliminated. Objectives are the prevention of decarburization, carburization and scaling. *The Lithium Corp.*

(13) Water Cooling:

Water cooling at a minimum of cost is the subject of catalog. Unit described is of exclusive rotary design and has no pistons, connecting rods, belts or pulleys, eliminating friction and wear, and is permanently sealed and oiled for life. Features described included a cooling capacity of 10 gallons an hour, pre-cooler for speedier cooling, optional foot-pedal and self-cleansing tank. *Frigidaire Commercial & Air Conditioning Division, General Motors Sales Corp.*

(14) Welding:

Shielded arc welding process through the use of coated rods is described in bulletin. Process prevents harmful penetration of oxygen or nitrogen into metal by shielding arc with neutral gas zone, produced by constituents of coating, and by chemically combining oxygen and nitrogen with reducing and denitrifying particles embodied in coating. *American Agile Corp.*

(15) Butterfly Valves:

Data and illustrations for both manual and automatic control of standard and wafer type butterfly or blast gate valves for control of air, gas, steam and liquids are featured in new 12-p. bulletin. Valves are said to seat tightly due to the 77½ deg. angle of closing and are suitable for wide ranges of temperatures. Complete specifications and flow charts are also included. *R-S Products Corp.*

(16) Industrial Water Conditioning:

Hot process water softeners for removal of hardness, silica and other scale forming material from boiler feed and industrial process waters are treated in new 48-p. catalog. Effective treatments for all water conditions are discussed and various types of installations diagrammed. Feed-water chemistry, heat balances, flow diagrams and engineering tables and charts are included. *Cochrane Corp.*

(17) Precision Boring Tools:

Micrometer expansion boring tool designed chiefly for diamond and tungsten carbide tipped boring practice where sturdy, rigid construction, as well as extremely fine cutter adjustment are the main requisites is described and illustrated in bulletin No. 500. Specific details of design, construction and application are given. *Davis Boring Tool Division, Larkin Packer Co., Inc.*

(18) Rotary Pneumatic Tools:

Illustrations and specifications of rotary pneumatic tools which are said to be an advance over piston type tools, screw drivers, air grinders, hammers, torque balancers, motor hoists, rivet sets and piston tools are given in booklet. Diagrams of construction features and engineering tables are included. *Independent Pneumatic Tool Co.*

(19) Repairing with Cement:

How to make practical, low-cost and lasting repairs to equipment and pipe lines without dismantling or use of heat is described in revised handbook. Diagrams and simple, concise instructions on sealing cracks in castings, stopping leaks in apparatus, making up tight pipe joints, patching concrete floors and walls, waterproofing cellars and cisterns are among problems discussed. *Smooth-On Mfg. Co.*

(20) Multi-Purpose Tools:

Multi-purpose tools for all operations on lathes, planers, slotters and shapers and for turret lathes, automatics, boring mills and other production machines are illustrated and described in catalog. These tools embody the principle of inserted cutter in permanent supporting shank or holder and are adapted to all classes of work. Complete specifications are given. *Armstrong Brothers Tool Co.*

(21) Friction Material Selection:

Chart which simplifies selection of most suitable friction material for any specified service is one of the features of new illustrated brochure. Rubbing speed, drum temperature and pressure are factors considered in the selection of correct friction material. Other charts include recommendations for specific types of clutches and brakes and tolerances on hole locations. *Johns-Manville.*

(22) Press Brake Specifications:

Major features of press brakes are noted in bulletin MBP. Among these are included extra long gibs and gibways which securely confine the ram at all positions of stroke; steel gears and pinions; automatic lubricating system, V belt motor drive excluding the main driving motor and starter, and double gearing and twin drive. Specifications for all sizes are listed. *Verson Allsteel Press Co.*

(23) Electric Hoists:

Application and use of electric hoists throughout industry are treated in detail. Plan is outlined in which equipment is divided into four units—suspensions, hoisting, motor and control—and through variations within each, standard mechanisms may be constructed to fit individual needs. Drawings, photographs and tables supplement descriptions. *Reading Chain & Block Corp.*

(24) Speed Control Applications:

Machines now in use are claimed to produce more and better work by the application of variable speed control discussed in bulletin G-412. In addition to production case histories, where speed control made possible production increases, illustrations and descriptions of three speed control units together with different designs and controls available are included. *Reeves Pulley Co.*

(25) Precision Honing Illustrated:

Profilographs and photomicrographs vividly illustrate claims made in bulletin for precision honing machine with variable speed and automatic stone feed-up. Used for holes 0.245 to 2.40 in. in diameter, they are said to correcet errors of out-of-round and taper produced by previous operations and accurately finish holes to very close tolerances as to size and straightness. *Sunnen Products Co.*

(26) Hydraulic Riveting Technique:

Advantages of hydraulic operation for riveting, punching, crimping and pressing are given in this 27-p. catalog. Among these are: Automatic cycle, compact installation, ease of handling, high speed operation, noiseless riveting, simple controls and safety features. Other features include portable and stationary types, capacities of 2 to 50 tons, and push button control. Shop and other views of the apparatus are given. *Hannifin Mfg. Co.*

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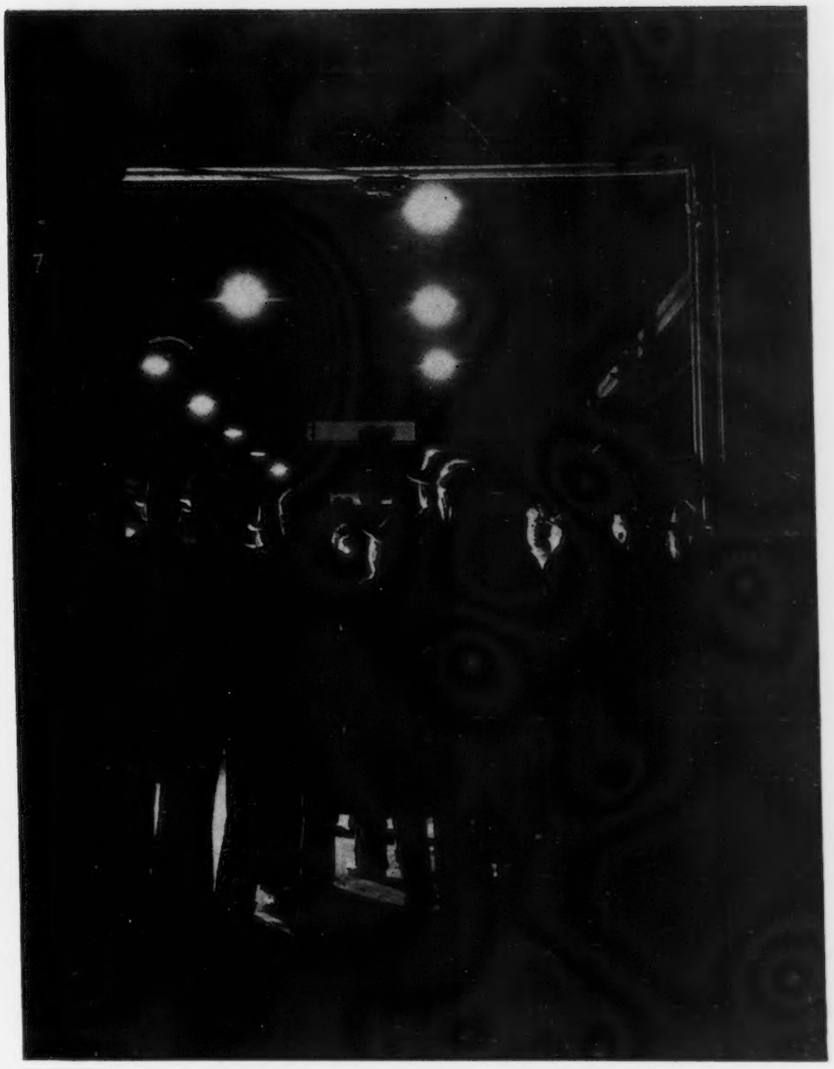


NO MORE STRIKES: "This government is determined to use all of its powers to express the will of its people, and to prevent interference with the production of materials essential to our nation's security." To many in industry those words of the President's May 27 "Emergency" address were the most hopeful, the last to be forgotten.

Mandatory Priorities On Steel Forecast By Dunn's Report

• • • **Steel manufacturers,** consumers and government defense agencies this week were again studying the adequacy of the nation's steel capacity to meet the growing needs of defense and of peace.

Without making any specific recommendations for steel plant expansion, Gano Dunn, special consultant for the Office of Production Management's production division, made his second quarterly report to President Roosevelt on the subject of steel capacity.

Shortly after the second Dunn report was made public, the President in a press interview at Washington broadly intimated that (1) mandatory priorities on steel will have to be applied and (2) that civilian supplies of steel will have to be sharply curtailed. This intimation fitted in with THE IRON AGE forecasts which said, further, that products to be included in the first priority order are plates, shapes, bars and semi-finished steel.

Mr. Dunn's report which, with the President's remarks, apparently presage a wide system of priorities on steel accompanied by a sharp curtailment of civilian supplies, discussed changes in the steel situation forced by the march of events since Feb. 28, 1941, when the first Dunn report was published.

"Passage of the Lend-Lease Act and further increases in the defense program have caused a sharp upward revision of estimated requirements for steel both for military and civilian uses," Mr. Dunn reports. "As a result of these increased demands the second report forecasts a deficit of 1.4 million tons for the calendar year 1941 as compared with a surplus of 10.1 million tons estimated in the first report; and a deficit of 6.4 million tons for the calendar year 1942 as compared with a surplus of 2.1 million tons estimated in the first report."

Such deficits would not affect the ability of the industry to meet all defense needs since the total Army, Navy, Maritime Commission and British requirements do not amount to more than 25 per cent of the present capacity of the industry, Mr. Dunn noted.

Highlights in the new Dunn report, which expressed doubt that any definite relationship could be established between civilian consumption and national income, included these points:

1. Prospective deficits in

SHIPMENTS OF STEEL PRODUCTS TO CONSUMING INDUSTRIES IN 1940 and estimated civilian requirements for 1941 and 1942. (By the Committee on Commercial Research, American Iron and Steel Institute. In millions of net tons of ingot equivalents converted at .68).

	Actual 1940	Estimate 1941	Estimate 1942
Construction industry, including highways, cantonments, and all other defense plant construction but excluding ships and public utility construction	6.9	9.4	8.1
Shipbuilding industry	1.3	2.6	3.5
Converting and processing, excluding shell forgings	4.1	6.2	6.5
Jobbers, dealers and distributors	8.8	11.8	12.3
Pressing, forming and stamping, including military items except ordnance	3.1	4.6	4.6
Miscellaneous industries	3.3	2.5	2.5
Container industry	4.3	4.7	4.7
Agricultural, including implement and equipment manufacturers	1.3	1.6	1.6
Machinery and tools	1.6	2.8	2.8
Electrical machinery and equipment	1.1	1.6	1.6
Automobiles, trucks and mechanized military equipment excluding tanks	10.6	11.0	9.0
Aircraft	.1	.3	.5
Railroad industry, including equipment builders	5.6	6.9	7.4
Oil, public utilities and mining	3.2	3.4	3.4
Total	55.3	69.4	68.5

From the Dunn report on steel capacity of May 22, 1941.

Great Lakes transportation capacity, blast furnace capacity and coke oven capacity forecast in the first report as likely to develop by the end of the current calendar year have been avoided by action of the industry to bring its production facilities into full balance.

2. Maximum reliable capacity of the industry which was estimated in the first report at 91,124,718 tons annually as of Dec. 31, 1941, has been increased to 91,338,669 tons annually and further increases are in prospect.

3. Creation of government-industry committees, which are now in the process of formation, promises to increase greatly the effective operation of the industry at maximum levels by bringing about an even loading of various companies through the reallocation of orders and by fully utilizing certain less efficient capacity that is not now in full use. Full estimates of capacity in the first report were specifically made contingent upon full utilization of existing capacity and an even distribution of orders among the producing companies.

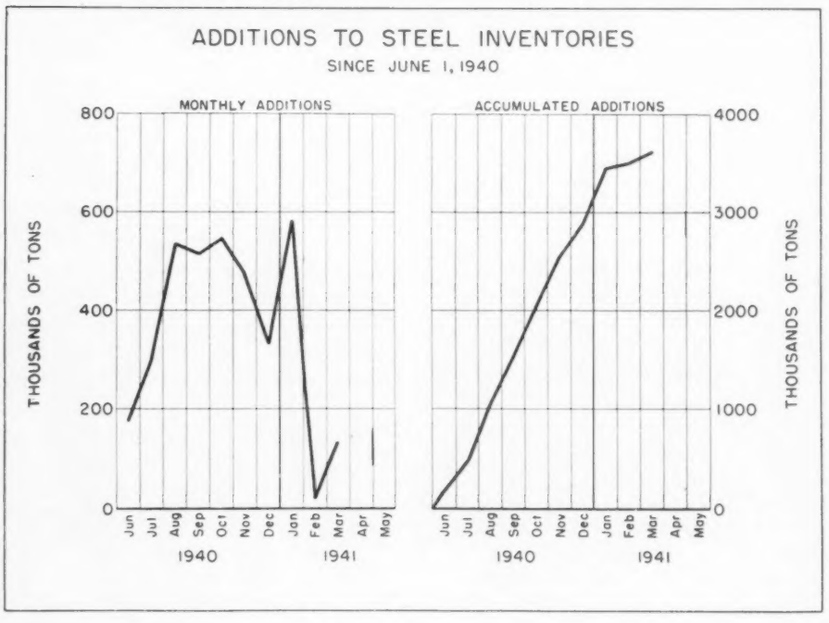
5. A decision must be made whether to curtail civilian consumption or to increase the capacity of the industry.

Mr. Dunn pointed out in his report that, with the various transportation, raw material and other factors which contribute to the production of the industry in full balance, any important additional steel capacity would involve increased mines, railroad, ship, coal and coke facilities, blast furnaces, scrap supply, steel furnaces and finishing mills. As an example, Mr. Dunn stated that to increase the facilities of the industry by 10,000,000 tons would cost approximately $1,250,000,000 when all these factors are taken into consideration. To construct the requisite facilities to expand capacity by 10,000,000 tons, again taking into account the factors mentioned, would require 3,000,000 tons of finished steel, or 4,160,000 tons of ingot steel, and take at least two years to build.

In estimating military demand for steel, Mr. Dunn used figures supplied by the Bureau of Research and Statistics of the Office of Production Management, which show total military requirements of 12.4 million tons for 1941 and 13.8 million tons for 1942.

His estimates of requirements for exports, largely to Great Britain and the Good Neighbor countries, are based largely on statements furnished by the British Iron and Steel Corporation and amount to 8.5 million tons for

A NOTABLE DECLINE in the rate at which steel inventories are being accumulated by consumers was indicated in the Dunn report. While inventory additions between June, 1940, and January, 1941, were at a rate of 500,000 tons a month, they declined to only 132,000 tons in March of this year. This decline is probably due both to the growing government control over distribution of steel and the more severe rationing policies with respect to civilian users employed by the steel industry.



A FLEET OF TRADE AUTOMATIC MARK LIFT TRUCKS

"Giving Excellent Service"

HANDLING TINPLATE AND STEEL COILS FOR FOLLANSBEE STEEL CORPORATION

FORGING ADDS STRENGTH

FOLLANSBEE STEEL CORPORATION

MANUFACTURERS

Follansbee Forge

ELECTRICAL STEEL SHEETS

FOLLANSBEE, W. VA.

MILLS: FOLLANSBEE, WEST VIRGINIA; TOROTO, OHIO

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

March 31, 1941

ALL AGREEMENTS ARE SUBJECT TO STRIKES, ACCIDENTS OR OTHER CONTINGENCIES BEYOND OUR CONTROL

Automatic Transportation Company
501 Liberty Avenue
Pittsburgh, Pennsylvania

Attention: Mr. L.N. Crissman

Dear Sir:

At the request of our Mr. Manion, I am writing this letter giving an account of our experience with the Automatic Tractors used for handling tinplate and coils in our Follansbee Plant.

We have in our plant five (5) 'Automatic lift trucks which have given excellent service. The first unit (type T-LAF) was purchased in 1929; followed by orders in 1933 for a type T.A.T.F. 3000# capacity model; in 1933 a model T.G.T.F. 6000# unit; in 1937 by a gasoline powered unit, Model T.M.T.F.; and in 1940 by a type T.H.R. unit.

Of the above units, four are fork tilting trucks and are used in our warehouse to facilitate the handling of tinplate. The fifth unit purchase in 1940 is for handling coils at our Cold Reducing Mills.

That these units have given satisfactory service is shown by the repeat orders.

At the present time, we are contemplating the purchase of another unit which will be an "Automatic" unit.

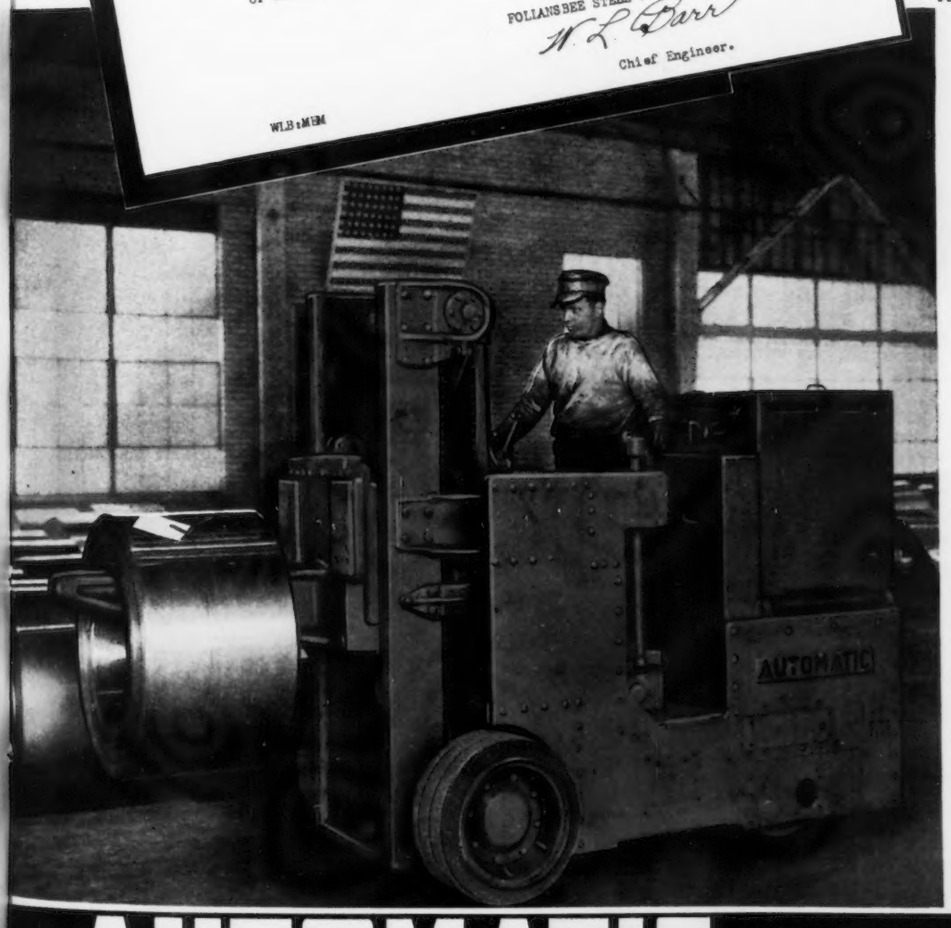
Yours truly,

FOLLANSBEE STEEL CORPORATION

W. L. Barr

Chief Engineer.

WLB:MEM



Here again is a customer's typical expression of the "excellent service" "AUTOMATICS" are giving every industry.

Note how this letter states . . . "That these units have *given satisfactory service* is shown by *repeat orders.*" The first "AUTOMATIC" purchased by Follansbee plant in 1929 was the determining factor for repeat orders for "AUTOMATICS" in 1933; again in 1937; again in 1940 and *now again* in 1941.

The continual acceptance of "AUTOMATICS" by this plant is only *one* example of hundreds of others because "AUTOMATIC" always furnishes proven equipment to give top performance and lowest-cost materials transportation and storage regardless of the problem.

Perhaps you, too, are about to consider a new or expanded materials handling program. Let the experience of this company be your guide to satisfactory performance.

Write, phone or wire—an "AUTOMATIC" representative will call to discuss your material handling program.

AUTOMATIC TRANSPORTATION CO.
DIV. OF THE YALE & TOWNE MFG. CO.
75 W. 87th ST. CHICAGO, ILL.

☆

The Latest Type "AUTOMATIC" Heavy-duty Coil Tractor in Service at Follansbee Plant

FULLY EQUIPPED WITH LATEST "AUTOMATIC" IMPROVEMENTS

For safe controlled speeds; with "AUTOMATIC" Speed-O-Matic full contactor control system—Controlled compression steering with "AUTOMATIC" patented "Power Steer" having indicator type directional control handle—Powered by new type "AUTOMATIC" Super-duty motors for maximum overall capacity with heaviest loads—Improved frame construction with heavy deep sectional members all unit welded and riveted at stress points—Compact chassis design for easy maneuvering in congested areas under full load. Equipped with latest type Industrial battery for heavy-duty operation.

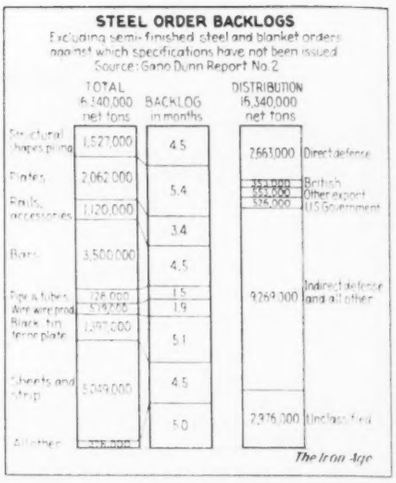
☆

TRADE **AUTOMATIC** MARK **MANUFACTURERS FOR OVER THIRTY YEARS**

Electric Propelled **INDUSTRIAL TRUCKS**

1941 and 10.3 million tons for 1942. These figures, although they have been adjusted downward from other available estimates to take into account duplications in these other estimates, are higher than the figures provided by the British Iron and Steel Corporation in order to include safety factors against the possibility of unforseen increases.

The chief difficulty in estimating total requirements for steel arises in the field of civilian consumption, Mr. Dunn points out in his report. The Bureau of Research and Statistics supplied an estimate of civilian requirements based on a completely unrestricted economy that did not take into account any curtailment of production of normal products and



ORDERS ON THE BOOKS of steel companies representing 75.6 per cent of the nation's steel capacity amounted to 16,340,000 tons of finished steel at the end of April, according to the Dunn report. This was equal to an average of five-months' production of present capacity ratings for the various products. In addition to the items listed above, orders for 1,590,931 tons of semi-finished steel were reported on the industry's books. About 34 per cent of orders for Great Britain are in the form of semi-finished steel. Data on unfilled orders, never before available, were collected by the American Iron and Steel Institute at the request of Mr. Dunn.

which was based on a national income of $95,000,000,000. On this basis an estimate is reached of civilian requirements of 72.5 million tons for 1941 and 88.6 million tons for 1942. The latter figure would raise the total estimated requirements under a completely unrestricted economy to 120.4 million tons for 1942.

This figure was rejected by Mr. Dunn on several grounds:

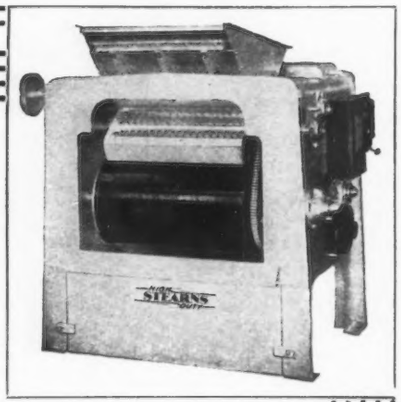
1. The reduction of automobile production already announced by the Office of Production Management, which reduces steel requirements of this industry by approximately 4.8 million tons for 1942.

Coming Events

June 23 to 27—American Society for Testing Materials, annual meeting, Chicago.

Sept. 23 to 26—Iron and Steel Engineers, annual convention and exposition, Cleveland.

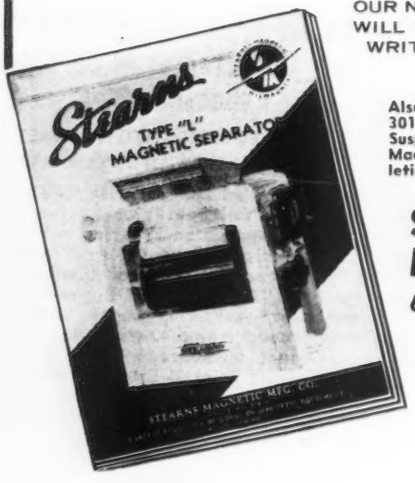
YOUR
SCRAP METAL
is valuable
when you use



Stearns MAGNETIC
TYPE "L" SEPARATORS

Why throw away your profits?

There are plenty of extra dollars in that scrap pile of yours. Put this improved Stearns separator on the job of reclaiming your brass, aluminum, babbit and other secondary metals from turnings, borings and metal refuse. It will more than pay for itself, efficient, economical, automatic. A definitely profitable investment.



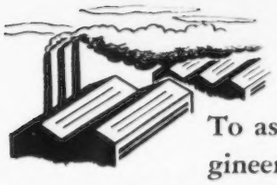
OUR NEW BULLETIN 46-A, AT LEFT WILL TELL YOU ALL ABOUT IT. WRITE FOR YOUR COPY TODAY.

Also Stearns Magnetic Pulleys (Bulletin 301), Spout Magnets (Bulletin 97-A), Suspended Magnets (Bulletin 25-B), Magnetic Clutches and Brakes (Bulletin 225).

STEARNS MAGNETIC MANUFACTURING CO.
635 S. 28th St. Milwaukee, Wis.

STEARNS-MAGNETIC MILWAUKEE

DRAW ON THIS STORE OF USER EXPERIENCE TO SPEED DEFENSE



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2. Duplication of requirements estimated for both the construction and shipbuilding industries, which figures, according to Mr. Dunn, appear both as military requirements and civilian requirements in the statistics supplied by the Bureau of Research and Statistics.

3. Limitation of labor supply. Mr. Dunn estimates that to produce 120.4 million tons of steel would require an increase of 6,047,200 employees in the steel producing and consuming industries over the number so employed in 1940, during which year steel production amounted to 53.3 million tons.

On the basis of these adjustments Mr. Dunn reduced the estimates of total demand supplied by the Bureau of Research and Statistics from 101.9 million tons to 87.6 million tons for 1941 and from 120.4 million tons to 102.4 million tons for 1942.

Mr. Dunn also was supplied with estimates of civilian requirements by the Committee on Commercial Research of the Iron and Steel Institute. This committee estimated civilian needs at 69.4 million tons in 1941 and 68.5 million tons in 1942. The latter figures, when military and export requirements are included, become 90.3 million tons for 1941 and 92.6 million tons for total demand in 1942.

"Under the present circumstances of rapidly changing conditions, it cannot reliably be predicted whether the 102.4 million ton estimate or the 92.6 million ton estimate will be the more nearly correct," Mr. Dunn stated in his report.

He therefore used a compromise figure, half-way between the two, in presenting his estimates of requirements to the President. This compromise figure for total requirements for the calendar year 1942 is 97.5 million tons, or 6.4 million tons higher than the estimated reliable capacity of the industry for the year.

(W. A. Hauck, OPM steel consultant, recommends new steel capacity for West Coast. See page 81)

American Rolling Mill To Expand Butler Plant

Butler, Pa.

• • • **American Rolling** Mill Co. here will expend $1,000,000 on improvements and additions to its mill. It is understood the amount covers a purchase of a reversing mill, additional annealing furnace capacity and other finishing facilities.

Westinghouse Signs With CIO

• • • **Westinghouse** Electric & Mfg. Co. last week signed an agreement with the CIO, the first one in its history. The contract included a supplementary agreement covering the district plants aside from the recently announced 10c. an hr. wage increase to employees in 24 plants. Supplementary agreement negotiations cover local working conditions.

DELIVERY.. not excuses

EVER-INCREASING production schedules demand "on time" delivery. Even good excuses cannot justify assembly line delays. It's Accurate's policy to get springs to you when you need them. When we say we'll deliver we'll deliver — you can depend on it. Of course we're busy — 7 days a week — but we're doing everything in our power to help you keep things running smoothly by supplying your urgent needs—*on time!*

And Accurate service doesn't end with delivery, for our engineers always stand ready to help solve your spring problems. Whatever your requirements may be . . . springs, wire forms, or stampings — let us go over them with you. You'll like Accurate quality and service!

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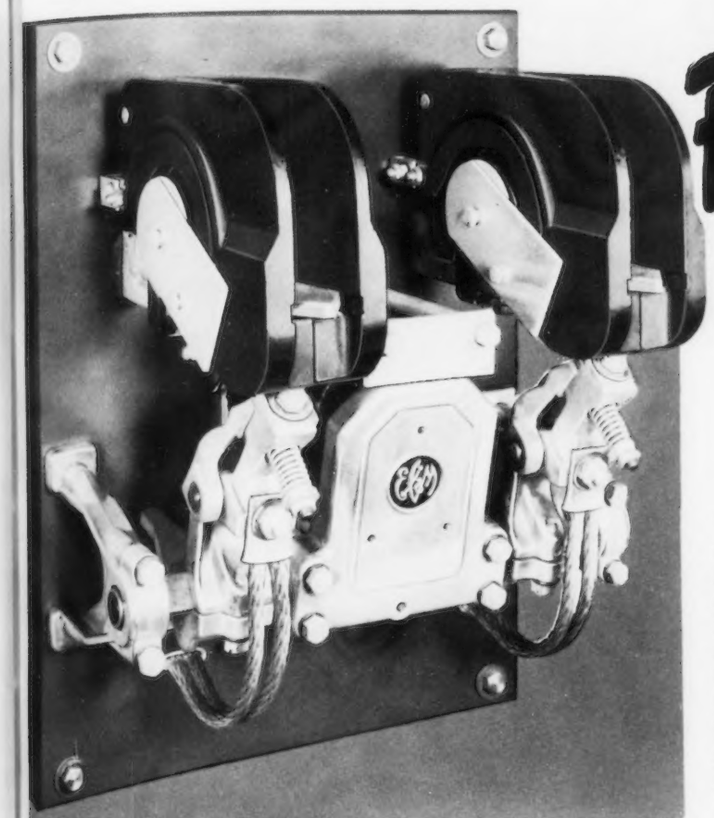


IN WELDING SERVICE

ON HEAT-TREATING JOBS

ON LIGHTING LOADS

ON MOTOR CONTROL

The results expected of magnetic contactors are most exacting. Certain applications require quick response—ability to open and close a circuit many times in rapid succession to meet high speed production methods. In others, the contactor remains closed—heavy currents must be handled for long periods of time without overheating. In all cases, the circuit must be ruptured with minimum wear from the hot destructive arc.

EC&M meets these conditions with LINE-ARC Magnetic Contactors. They're designed for *speed* with moving parts of high-strength, aluminum alloys which reduce weight and permit *lightning fast* response. Current-carrying parts are liberally designed to handle not only normal loads continuously with minimum rise in temperature but have reserve capacity to take care of the abnormal loads which, experience shows, can not always be avoided.

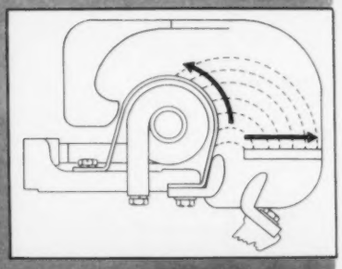
In arc-rupturing ability, these LINE-ARC Contactors have no equal. Contacts have high wear-resistance; they're cold formed by a special process giving high Brinell hardness throughout their entire thickness. Combined with the LINE-ARC principle, which scientifically controls the arc as the circuit is broken, the life of contacts has been increased beyond any previous standard of comparison.

Give these LINE-ARC Contactors an opportunity to prove their worth in your plant. Install them on controllers, welders, furnaces, etc. You'll find their performance outstanding.

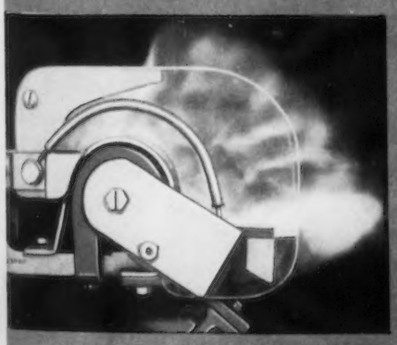
THE LINE-ARC PRINCIPLE GIVES LONG CONTACT LIFE

•

NO DESTRUCTIVE BURNING OF ARC SHIELDS

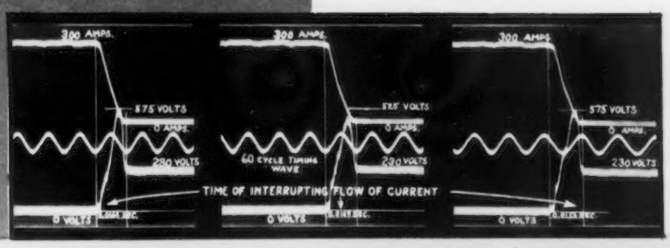


As the contacts start to separate, the arc is immediately removed from the contact tips, the ends of the arc traveling rapidly in opposite directions along the circular blow-out guard and horizontal arcing-plate, being stretched out in a line, centered between but not touching the arc shields.



Left is shown a LINE-ARC Contactor specially fitted with glass arc shields to demonstrate the LINE-ARC principle. The glass was neither smudged nor harmed in this test. This unit is still in active use at the EC&M Factory. All visitors witness this convincing demonstration of the LINE-ARC principle.

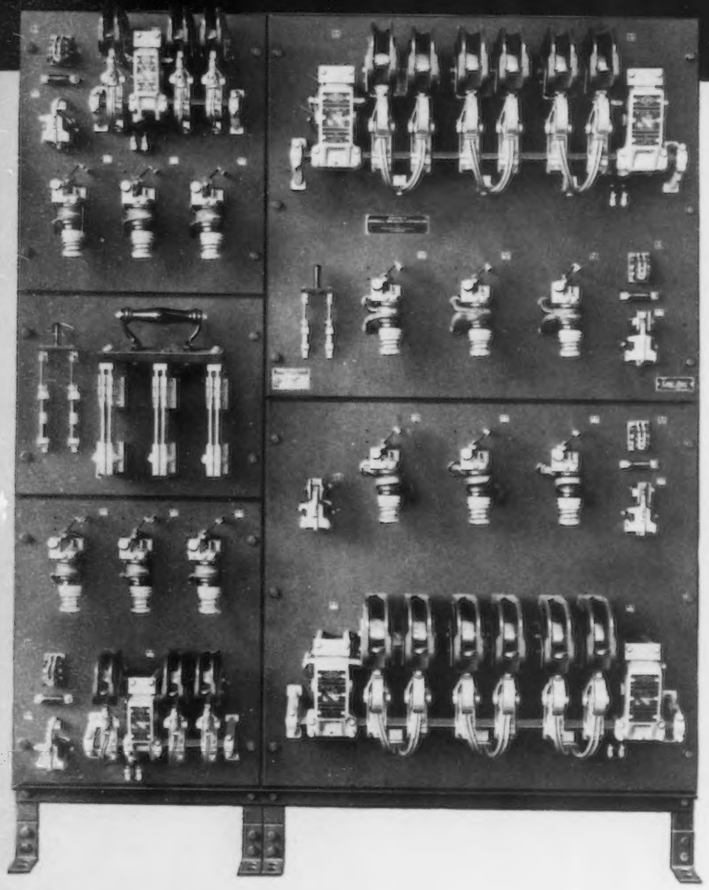
Oscillograph curve of LINE-ARC Contactor rupturing 300% load. The current curve is a smooth, straight line from maximum to zero value. There is no restriking of the arc and but one smooth, rounded voltage peak across the contacts as the circuit is opened. The time of rupturing is consistent and of short duration.



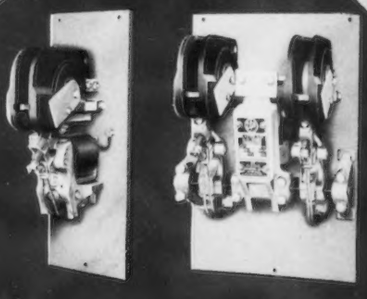
EC&M LINE-ARC MAGNETIC CONTACTORS FOR-AC AND-DC

(TRADE MARK)

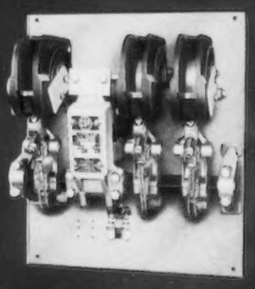
Unit Contactors or Control Panels



WELDER CONTACTORS



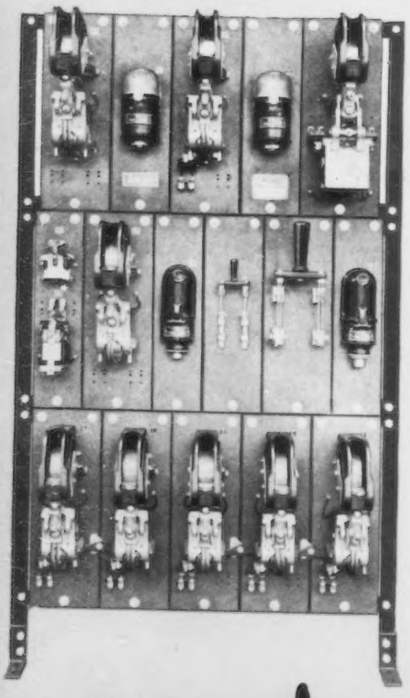
SINGLE POLE DOUBLE POLE



TRIPLE POLE

D-c Contactors are built in Single and Double Pole designs with normally open contacts. Also in the single pole, spring-closed style with normally closed contacts for "off-point" braking and similar service. Standard mounting is on slate base with composition panel, optionally supplied when requested.

A-c Contactors are built in Double and Triple Pole designs for all applications except welding; welder contactors being of D.P. design. Continuous capacity operating coils are used for all standard voltages, 110 to 550 volts, 25 and 60 cycles.



HEATER or FURNACE PANELS

MOTOR CONTROL for A-C or D-C MILL or CRANE

Specify

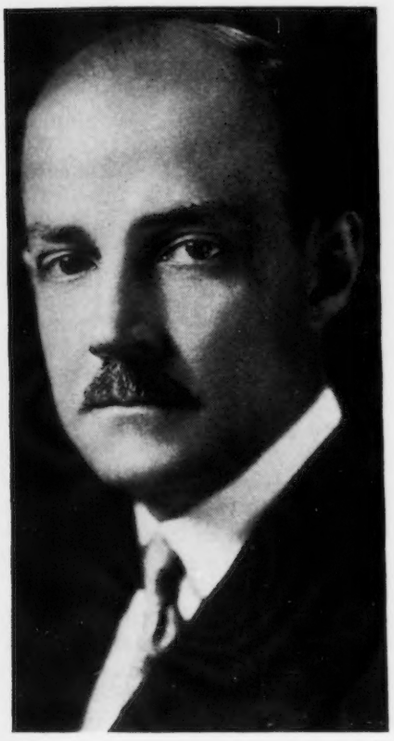
Bulletin 1140 CONTACTORS for A-c Service — Bulletin 1146 CONTACTORS for D-c Service
Bulletin 1211 CONTACTORS for Welder Service

Wick, of Famed Steel Family, Took Job at 9

Cleveland

• • • **The retirement of** Myron A. Wick from Republic Steel Corp. on July 1 finishes only a chapter in a career prominent in the steel industry since before the World War. It would not be surprising to see Mr. Wick sooner or later return to manufacturing, his field prior to becoming vice-president in charge of finance for Republic.

He and his nephew, who is connected with Steel & Tubes (Republic subsidiary), are the last of a family famous in the steel business and particularly prominent at Youngstown, Ohio. President of Steel & Tubes, Inc., now a part of Republic, he joined the Republic organization in 1930 as assistant to the president. The following year he was named vice-president in charge of finance.



Myron A. Wick

Mr. Wick recalls how as a small boy he used to clamber into his father's bed on Sunday mornings to hear the story of how his father would some day build a plant for the rolling of steel in Youngstown. Prior to the senior Mr. Wick's formation of the Ohio Steel Co. in about 1890, iron from the Mahoning Valley was taken to Pittsburgh for conversion and then brought back to Youngstown. The Ohio Steel Co., now the Ohio Works of Carnegie-Illinois Steel Corp., provided the first steel produced in the Valley, with two Bessemer converters.

M. A. Wick started working at the plant during part of his summer vacations when he was only a boy and has in his possession weigh slips he made out on one of his early jobs at the advanced age of nine.

Other employment in young Wick's early career included one month each summer collecting bills for Wick Brothers Bank at the handsome salary of $3 per week. On one black Saturday he was employed by a relative un-

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A battery of 4 electro-analyzers determines copper content of the alloy.

Checking hardness of parts by Rockwell machine.

Working with the finest precision instruments procurable, a corps of skilled inspectors keep a constant, unrelaxing check on every step in the production of AMPCO METAL — from the melting furnaces to the machining of finished parts.

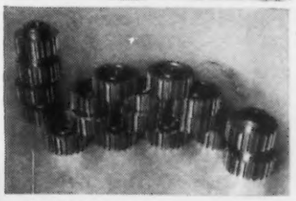
In one sense, these men maintain the quality reputation of AMPCO — but in a larger sense they safeguard the reputation of more than 2000 manufacturers who depend on the unfailing performance of AMPCO METAL for vital, highly stressed parts in products or production tools.

At Your Service

Your requirements will receive painstaking attention. AMPCO METAL offers engineers an alloy of the aluminum bronze class with exceptional resistance to wear, fatigue, impact and corrosion. It's the metal that performs where all others fail.

Made in six grades, to a hardness of 352 Brinell. Our engineers will welcome your inquiry and supply full information.

AMPCO METAL, INC.
Department IR-65 Milwaukee, Wisconsin



BUSHINGS . . . the unusual wear-resistant qualities of AMPCO METAL appeal to designing engineers. Service life is increased several times.

GEARS . . . the toughness and wear resistance typical of AMPCO METAL recommend it for all types of gears, ranging from a fraction of a pound to hundreds of pounds each.

AMPCO METAL
The Metal Without An Equal
AMPCO

loading coal and cement and after working all day and foregoing supper was paid for his labor 25c.—the hardest quarter he ever earned and the last time he ever worked for that particular relative.

After being graduated from Sheffield Scientific School of Yale University in 1904, he soon became secretary and treasurer of the Youngstown Furnace Co. and from 1909 to 1912 served as treasurer of the Delaware River Steel Co. at Chester, Pa.

In 1914 Mr. Wick joined his brother who had bought Elyria Iron & Steel Co., Elyria, Ohio, twelve years earlier. Mr. Wick served as treasurer. The company made tie plates and tubing. Seven years later the purchase of the patents covering the Johnson process of tube manufacture led to the organization of Steel & Tubes, Inc., which later became a part of Republic Steel Corp.

Taking charge of Republic finances in the early 30's provided plenty of headaches for Mr. Wick, as the company was then new and the depression was on in full force.

Mr. Wick leaves Republic with confidence that the company is now in good financial shape. Looking for some more "fun" and believing that opportunities are more abundant today than at any time in the last ten or fifteen years, he does not intend to be idle.

"My association with Republic and all of its executives," said Mr. Wick, "has been a pleasant one that is not easily broken, especially since I have been with the company since its inception."

Republic officials are planning a farewell dinner for Mr. Wick prior to July 1. In commenting on his resignation, T. M. Girdler, chairman of Republic, said, "Mr. Wick's resignation is accepted by the board of directors with a great deal of regret. He has been an important member of Republic's executive family since the company was organized and he has contributed substantially to Republic's progress."

IRON and STEEL PRODUCTS

ANDREWS STEEL

THE Andrews Steel trade-mark is indisputable proof of high quality and ability to deliver extra performance under all conditions. But, more than that . . . this famous trade-mark safeguards your good name because Andrews quality is transmitted to every product of which iron and steel become a part. Your inquiries will be welcomed.

Andrews Products in Carbon and Alloy Steel: Bars • Plates • Universal Mill Plates Sheet Bars • Billets • Blooms • Slabs.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

Consumption of Scrap During 1941 Totals 17,518,000 Tons

Washington

• • • **In the first four months** of 1941 the steel industry consumed 17,518,000 tons of iron and steel scrap, a record breaking tonnage, according to reports of the Institute of Scrap Iron and Steel, Inc. During the same period in 1940, 11,669,000 tons were used.

This increase of 50 per cent in the use of scrap compares with similar rises in the production of steel ingots and pig iron. In spite of the unprecedented requirements for steel, pig iron and castings for civilian and defense activities, the institute reports that scrap to support these programs has been available.

Domestic consumption of scrap in April was 4,406,000 tons, while exports during March, the latest month for which government figures are available, totaled on 54,883 tons, 45,084 tons of which went to Great Britain.

Pittsburgh Adopts 10-Point Plan to Get Defense Orders

Pittsburgh

• • • **A specific, routine,** continuous checking on national defense news, and a hard-hitting follow-up plan on a prospect list, comprise the major part of the technique employed by the Pittsburgh Commission for Industrial Expansion in its attempt to gain defense subcontract work as well as prime governmental contracts for manufacturing concerns in the Pittsburgh district and eleven adjoining counties.

The Pittsburgh plan, which has been under the direction of C. E. Robinson, secretary-manager of the organization, brought results within a month following initial machine tool survey originally sponsored by the National Association of Manufacturers.

A brief resume of the technique used here by the Pittsburgh Commission is outlined below:

1. A complete inventory of productive equipment must be taken and be kept up-to-date. Complete records must be maintained so that various types of equipment are segregated.

2. All prime contractors and large manufacturers should be notified by letters or other means of the available equipment and the various types of products that can be produced in the locality. The Pittsburgh Commission recently sent out to prime contractors and other manufacturers letters detailing the type of equipment available, as well as specific industrial groups who are in a position to perform defense subcontract work.

3. A list of items purchased by various procurement and ordnance offices of the government should be studied closely and items on the critical or priority list should be checked. Local companies should be consulted to see if they are equipped to make or are making items on the critical list. If they are not, a movement could be initiated within the most progressive and the best equipped company leading towards a program to produce some needed items on the critical list.

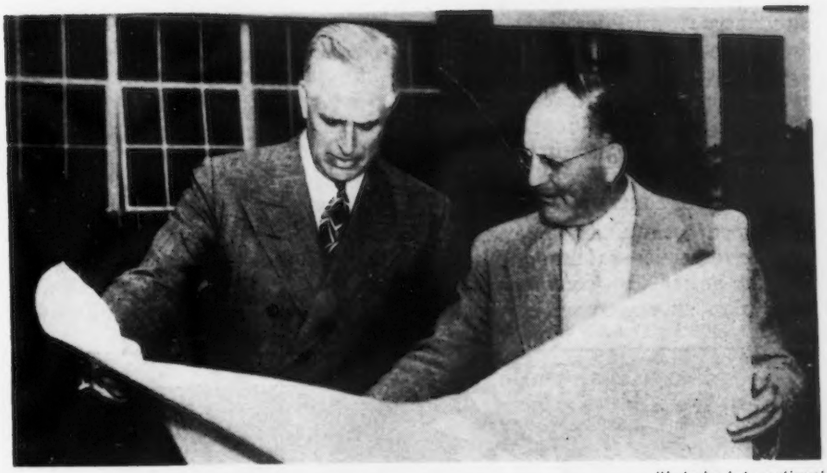


Photo by International

BAGGED THE BISMARCK: Britons give credit to a Consolidated Aircraft Corp. (Catalina) flying boat for discovering the German battleship "Bismarck" so that it could be destroyed far at sea by the RAF and surface forces. In the top photograph Maj. Reuben H. Fleet (left), president of Consolidated, is showing production plans to Merrill C. Meigs, chief of the OPM's aircraft production division. Below, a Catalina flying boat.

4. Data and information should be in such shape that prime contractors and others inquiring for subcontract work can receive definite answers to questions as quickly as possible. Some local manufacturers may know of available machinery that could handle the inquiry and would be willing to buy the machinery.

5. Prime contractors should be invited to send production engineers with drawings and specifications to the community. A production "clinic" such as one held at Pittsburgh for the Baldwin Locomotive Works covering the subcontracting parts on tanks, could be arranged. Manufacturing companies in the locality capable of producing parts of a prime contract could meet in consultation with the prime contractor's representatives and definite information as to the ability of various manufacturers to perform such

subcontract work can be quickly decided upon. As a general rule manufacturers interested and capable of doing subcontract work can obtain duplicate blueprints and specifications and can immediately transmit quotations and estimates to the prime contractor.

6. Local organizations can distribute inquiries quickly and widely and enlist the cooperation of local plant management in passing inquiries on to other local firms that may be better equipped to handle the job in question. A local advisory group composed of three or four production men could expedite the search for subcontracting work by directing the inquiries to the proper sources.

7. If possible, large local manufacturers should use spare capacity available in the local area and these large companies should be asked for their cooperation in making and maintaining up-to-date an area survey of productive equipment.

8. With the guidance and help of a large local industrial concern and the Defense Contract Service, it may be possible to consolidate several of the small one to ten man machine shops into a valuable nucleus production shop. Such a consolidation would require production guidance from manufacturing concerns and assistance from the Federal Reserve system. If properly set up, such an operating unit could handle not only subcontracts but prime contracts as well.

9. Large prime contractors in a local area should be repeatedly reminded of the production facilities in smaller concerns when opportunities for bidding on contracts are presented. Similar to the York plan, such a setup would mean that the larger concerns could act as order takers and engineering department for a group of smaller plants.

10. A continual check on shortages in raw materials should be maintained and any ideas on substitutions should be brought to the attention of the proper authorities, which in most cases would be the nearest OPM representatives.

Safe Handling

The super-stamina of Yellow Strand is common knowledge in steel mills and foundries. Now, we're braiding this invincible wire rope into slings—the last word in flexibility, kink resistance, safety, durability.

Yellow Strand Wire Rope Plaited Safety Slings* are "soft"—handle highly finished steel rolls without damage. They hold irregular loads snugly, handle heaviest castings safely.

Many types and constructions and a wide range of fittings are available; or, our engineers will design a Yellow Strand Plaited Safety Sling for your exact requirements.

FREE Riggers' Hand Book
New Edition Contains full data on Plaited Safety Slings, standard Yellow Strand Slings, fittings, etc. No charge, of course.

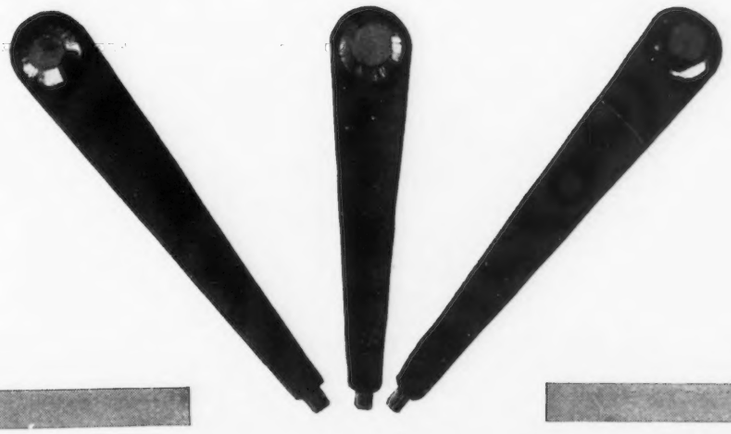
Broderick & Bascom Rope Co., St. Louis
Branches: New York, Chicago, Houston, Portland, Seattle

Yellow Strand Plaited Safety Slings

*Murray Patents: U. S. Patents 1475859, 1524671; Canadian Patents 252874, 258068.

Nickel Steel Substitutions —Erratum

ON page 61 of the May 15 issue, in a paper discussing aircraft gear steels, delivered before the annual meeting of the American Gear Manufacturers Association, Dr. N. E. Woldman was quoted as recommending as substitutes for the carburizing type nickel steels, SAE 2515 and 3312, chrome vanadium steels like SAE 4820 and 4615, chrome molybdenum steels and the Chrysler Amola steels. The specification numbers are in error. The steels Dr. Woldman referred to are SAE 6115 and 6120, containing about 1 per cent chromium and 0.15 per cent vanadium, and not SAE 4820 and 4615, which are nickel steels. Where higher carbon steels are to be used, SAE 4130, another chrome vanadium steel, is a possible substitute.



THE BIG GUNS!

FOR STAINLESS WELDING

Use Arcos electrodes and be sure; twenty-eight analyses . . . an electrode for every weldable stainless alloy.

ARCOS CORPORATION
401 N. Broad St., Phila., Pa.

"QUALITY WELD METAL EASILY DEPOSITED"

Distributors Warehouse Stocks in the Following Cities:

ATLANTA, GA.	*J. M. Tull Metal & Supply Co.*
BUFFALO, N. Y.	*Root, Neal & Co.*
BORGER, TEXAS	*Hart Industrial Supply Co.*
BOSTON, MASS. (Belmont)	*H. Boker & Co., Inc.; W. E. Fluke*
CHICAGO, ILL.	*Machinery & Welder Corp.*
CINCINNATI, OHIO	*Williams & Co., Inc.*
CLEVELAND, OHIO	*Williams & Co., Inc.*
COLUMBUS, OHIO	*Williams & Co., Inc.*
DETROIT, MICHIGAN	*C. E. Phillips & Co., Inc.*
ERIE, PENNA.	*Boyd Welding Co.*
FT. WAYNE, IND.	*Wayne Welding Supply Co., Inc.*
HONOLULU, HAWAII	*Hawaiian Gas Products, Ltd.*
HOUSTON, TEXAS	*Champion Rivet Co. of Texas*
INDIANAPOLIS, IND.	*Allied Weld-Craft, Inc.*
KANSAS CITY, MO.	*Welders Supply & Repair Co.*
KINGSPORT, TENN.	*Slip-Not Belting Corp.*
LOS ANGELES, CALIF.	*Ducommun Metals & Supply Co.*
MILWAUKEE, WIS.	*Machinery & Welder Corp.*
MOLINE, ILL.	*Machinery & Welder Corp.*
NEW YORK, N. Y.	*H. Boker & Co., Inc.*
OKLAHOMA CITY, OKLA.	*Hart Industrial Supply Co.*
PAMPA, TEXAS	*Hart Industrial Supply Co.*
PITTSBURGH, PA.	*Williams & Co., Inc.*
PORTLAND, OREGON	*Industrial Specialties Co.*
ROCHESTER, N. Y.	*Welding Supply Co.*
SAN FRANCISCO, CALIF.	*Ducommun Metals & Supply Co.*
SEATTLE, WASH.	*H. A. Cheever Co.*
ST. LOUIS, MO.	*Machinery & Welder Corp.*
SYRACUSE, N. Y.	*Welding Supply Co.*
TOLEDO, OHIO	*Williams & Co., Inc.*

Strike Issue Fumbled, Defense Clinic Is Told

Youngstown

• • • **The drastic effect** of recent strikes, the difficulty in finding skilled labor, price questions and other problems were examined here recently at a defense clinic for Ohio business men. Meetings have been held in other cities.

Fumbling of the strike issue was attacked by Ralph Coxhead, New York munitions expert, who also advocated increasing working hours in the present serious labor shortage. He told how the Bethlehem Steel strike affected construction of a bomber plant, while a strike in a California die casting plant held up production in eight plane factories; a strike at the S. S. White Co. held up 80 bombers, and a strike in the aluminum industry delayed $17,000,000 in aircraft orders.

Facing a possible enemy who has a highly efficient economic machine, and who loses no time in arguing about profits, this nation must guard against uncontrolled price hiking which might upset the defense program, said Col. George S. Brady, industrial consultant in the OPM.

William S. Shipley of York, Pa., outlined the famous York plan of pooling community plants. The meeting was sponsored by the National Association of Manufacturers, Mahoning Valley industrial conference, and the Ohio Manufacturers Association.

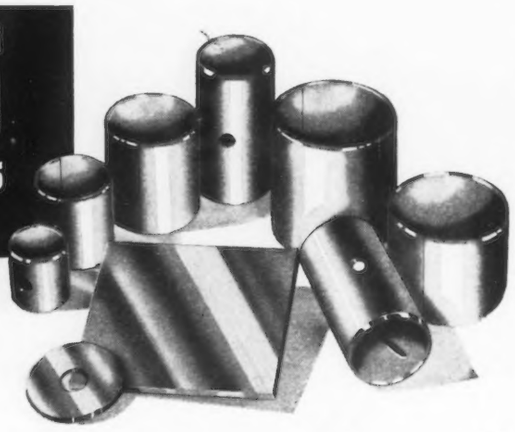
(CONTINUED ON PAGE 102)

NO CLOSED SHOP: Arthur B. Homer (above), vice-president of Bethlehem Steel Co.'s shipbuilding division, said recently before the Senate Defense Investigating committee that his company was not at fault in the Pacific Coast strike now halting work on more than $340 million of ships. He said his company was willing to sign contracts with the unions but would not agree to any closed shop provisions.

Photo by Harris & Ewing

SOMETHING NEW in BEARINGS

by JOHNSON BRONZE



Pre-Cast Bearing
Bronze on Steel

Write for this

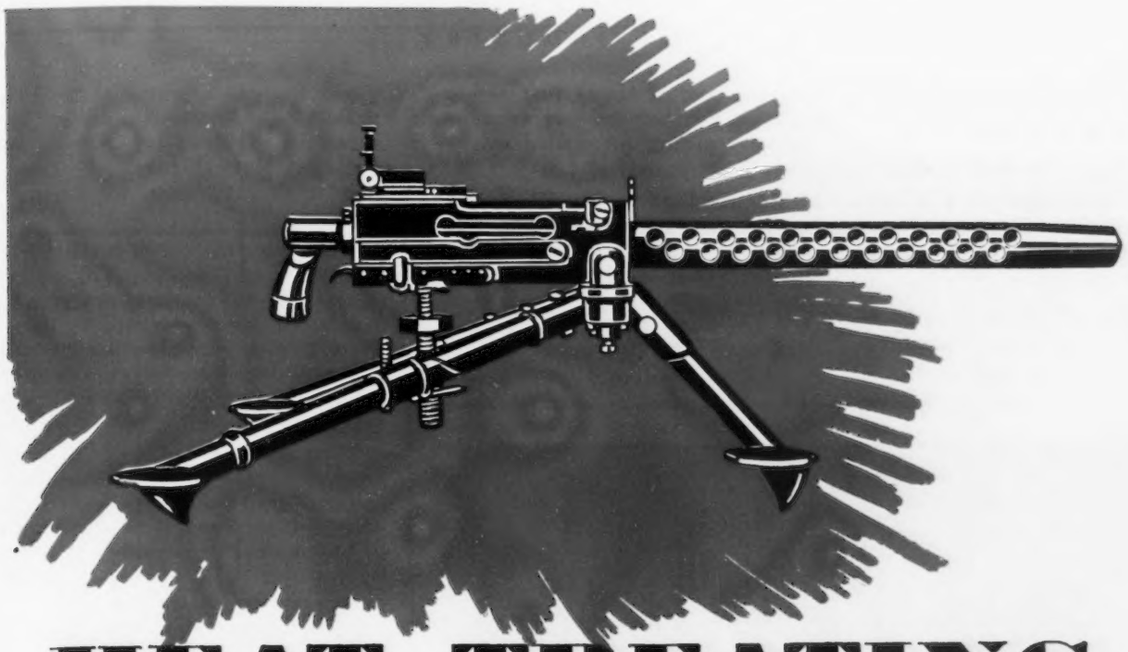
folder that fully describes this new and unusual bearing. It's FREE.

Here is a new and unusual bearing material that has already established many new records of performance. *Pre-Cast Bearing* BRONZE ON STEEL, a thin wall, laminated type of bearing, combines the bearing qualities of bronze with the strength of steel.

The bronze alloy—S.A.E. 64, in powder form—is permanently bonded to strip steel. The process of manufacturing bearings or bushings from *Pre-Cast Bearing* BRONZE ON STEEL is essentially a stamping and forming operation. As a result, few bearings are as economical as *Pre-Cast Bearing* BRONZE ON STEEL, particularly when there is production quantities.

Pre-Cast Bearing BRONZE ON STEEL is also available in rolls—up to 400 feet in length—or as plates, washers or various types of stampings. It will pay you to investigate this new type of bearing. A request, on your business letterhead, will bring you complete information plus a sample bearing. Write TODAY.

JOHNSON BRONZE
Sleeve BEARING HEADQUARTERS
505 S. MILL STREET • NEW CASTLE, PA.



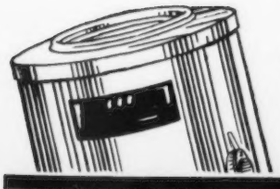
HEAT TREATING parts for small arms

The automatic rifles and machine guns being produced under the defense program in ever-increasing quantities undergo a heat treatment not difficult to the plant familiar with the modern salt bath materials available today.

Bolts, receivers, triggers, hammers, followers—a myriad of small parts of various sizes and shapes — are "naturals" for the salt bath method.

For carburizing these parts, we provide Perliton Liquid Carburizer. Two hours in this bath at 1550° F., to cite one plant's experience, gives a case of .020" . . . . a uniform, true carbon case.

The quench is in Houghton's Quenching Oil — stable, long lived, free from sludging, no fractional distillation.



The cleaning is done in a special HOUGHTO-CLEAN for cleaning after salt bath - oil quench treatment.

The draw is in Houghton's Draw Temp 275, which provides a clear bath free from fuming or sludge, with sharp melting point and wide range.

Blackening gun parts by a one-bath process, much faster than the old "browning" method, is accomplished by the use of Houghto-Black, a low-temperature salt bath treatment.

For rust prevention, use Houghton's RUST VETO for adequate protection.

Those are only six of the many Houghton Products for munition manufacturing. For hardening, preheating, reheating, annealing, carburizing, tempering or blackening—consult Houghton's Munitions Department, set up to serve industry on metal working problems. Write for the new booklet "Defense Data from the Houghton Line." E. F. HOUGHTON & COMPANY, Philadelphia, Chicago and Detroit.

THE HOUGHTON LINE
OF PRODUCTS FOR THE METAL INDUSTRY

Tool Engineers Active in Defense Training Projects

• • • **Defense training courses** in tool engineering are being sponsored or taught by members of various chapters of the American Society of Tool Engineers. Through this cooperative activity on the part of the society with local educational bodies and local industry, it is hoped that some of the bottlenecks in emergency defense training of skilled workers will be removed.

At Rochester, N. Y., for example, according to J. S. Gray, regional chairman, A.S.T.E. committee on Emergency Defense training, some 31 men from industry are already teaching tool and die design in Rochester schools. These include a course at the University of Rochester under the direction of Mr. Gray, who is associated with Bausch & Lomb, and William Gordon of Eastman Kodak Co.

Through the cooperation of members of the A.S.T.E., four classes have been organized to teach tool engineering in Baltimore to meet the shortage of tool engineers for defense work in this area. The A.S.T.E. members are teaching these classes "after hours," retaining their full daytime occupation in local industries. The program is under the direction of Dean S. S. Steinberg of Baltimore Polytechnic Institute. Sponsoring of a tuition-free tool design course at the Newark College of Engineering has been announced by Herbert D. Hall, chairman, National Educational Committee, A.S.T.E. The course is designed to help meet the shortage in tool designers in the New York-New Jersey area. Serving as advisory board for the course—which is underwritten by the United States Office of Education—are the following: C. B. Carlson, Thos. A. Edison, Inc.; H. B. Cook, Wright Aeronautical Corp.; W. T. Gray, Thos. A. Edison Co., Inc.; Mr. Hall; F. J. Oliver of THE IRON AGE; F B. Shannon, Western Electric Co.; C. F. Sheeley, Hyatt Bearing Division; C. L. Thomson, Singer Mfg. Co.; and J. L. Webster, Eclipse Aviation Div. of Bendix Corp.

The following members of the Toledo Chapter of the A.S.T.E. are acting as instructors on defense training at the University of Toledo:

From Spicer Mfg. Co., August Ehrhardt, Philip Lindhuber, Harry A. Maier, and Carl Ostrosky; and Noel W. Franklin from Electric Autolite; Claude E. Robitaille of Doehler Die Casting Co.; Harold G. Thompson of DeVilbiss Co., and L. A. Kelley of Conklin Pen Co. The program which is under the direction of Delos M. Palmer, dean of engineering of the university, includes marine, diesel, automotive and aeronautical work.

J. B. Savits, regional chairman for Massachusetts of the Emergency Defense Training Committee of the A.S.T.E., has been appointed by Sidney Hillman as advisor on the Committee of the

END VIEW OF
HEXAGON DRIVE
GAIRING
Type A Counterbores
These simple, powerfully constructed, short shank counterbores rate high in cutting efficiency. Holders, of Morse Taper design, come in five sizes taking cutters from 1-4" to 5" in dia. Complete assemblies, holders, cutters and pilots are carried in stock. Larger sizes made up quickly.
A trial will convince you that Type A, due to its low cost, is particularly desirable for production counterboring and spot facing.
The Gairing Tool Co., Detroit, Michigan
In Canada, Hi-Speed Tools Ltd., Galt, Ont.
SPECIALISTS IN FINE CUTTING TOOLS FOR 24 YEARS

The Type A Counterbore illustrated in the above advertisement is described in great detail on pages 4 and 5 of Gairing Catalogue No. 40. For complete information, please turn to those pages.

Engineering Suggestions

TO HELP TEMPERING FURNACE BUYERS

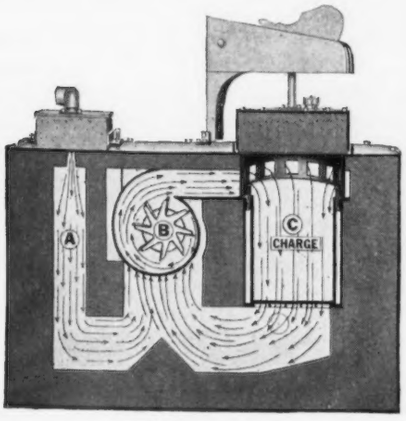
Many manufacturers find it necessary to expand heat treating department capacity practically overnight. Equipment chosen will be required to efficiently and accurately produce work that must conform to closest government and private tempering specifications. It is not strange then, that potential furnace buyers are interested in determining, in advance, the correct type of heating, correct capacity, whether furnace should be box or vertical type, etc.

The following suggestions not only apply to tempering of steel and iron alloys—but, with few exceptions, to the listed operations:

1. Annealing of brass.
2. Heat treating of aluminum castings, forgings, formed shapes, etc.
3. Heat treating magnesium alloys.
4. Stress relieving of welded parts.
5. Preheating of parts to be hardened.

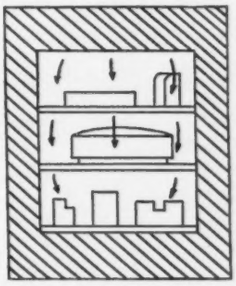
WHAT TYPE OF HEATING WILL I FIND MOST ACCURATE FOR TEMPERING AND OTHER OPERATIONS WITHIN THE 200° TO 1300° RANGE?

Answer: Forced convection heating, as pictured in the furnace diagram below. Electric elements or gas or oil burners should be located in a separate and remote chamber *within* the furnace but away from the charge so that the possibility of radiant heat affecting temperature uniformity is avoided. The circulating fan should be of the positive pressure type of ample size. Circulation of the heated air should be at high speed and follow a completely defined path. In no instance should the heated air follow a path that will short cut and fail to pass through all parts of the work chamber. Temperature control should be of the throttling type. Proper design should assure Rockwell hardness of plus or minus 1 point.



WHAT TYPE OF FURNACE IS BEST SUITED TO THE AVERAGE HEAT TREATING DEPARTMENT? BOX OR VERTICAL TYPE?

Answer: Box type tempering furnaces are used where parts are loaded and unloaded one at a time, as with dies or tools, or in the case of small parts where production is very limited, or where



In box furnace all work is instantly accessible. Tools and dies can be charged or removed one at a time

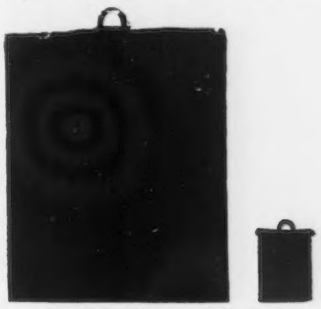
parts must be removed one at a time in order that they will be at the proper temperature for some subsequent processing.

Dense charge occupies entire work basket in vertical furnace. All chamber space is utilized

For any type of production work that can be loaded in baskets for tempering, the vertical type furnace is better. It will turn out 2 to 10 times more work per square foot of floor space than the box type or continuous furnace as the work is piled up in the basket rather than spread out on the hearth. Thus the maximum use is made of furnace volume in the vertical type tempering furnace. This is possible with even the densest loads because as previously mentioned, heated air is driven *through* the charge.

HOW ABOUT CAPACITY? FOR MY PRODUCTION WORK WHAT SIZE FURNACE WILL I NEED?

Answer: To determine this, it is necessary to know the amount of work you must handle, loading weight, and sections involved. The actual weight capacity of any given vertical furnace for your particular job can be determined



Silhouettes show comparative sizes of work baskets in a 48″ x 60″ and a 12″ x 16″ vertical furnace

by filling and weighing a tote box of known dimensions and thereby obtaining the weight per cubic foot. Heating time required for various sections is generally obtained by experience although the rule of "hour per inch of thickness" is generally safe to use if it is remembered that the *lower* the temperature the *longer* the time required for heating. Where sections require one hour heating the proper size furnace is one which has a cubic volume equal to the cubic feet of work desired per hour. Sections taking two hours heating require a furnace capacity double the desired cubic foot production per hour, etc. Following is a list of standard furnace sizes available, and the cubic content of the baskets.

Furnace Basket Size	*Cubic Foot Volume of Basket*
12″ x 16″	1.05
16″ x 20″	2.33
22″ x 26″	5.72
22″ x 36″	7.92
25″ x 20″	5.77
25″ x 30″	8.66
28″ x 28″	9.97
28″ x 36″	12.82
33″ x 36″	17.81
38″ x 36″	23.65
38″ x 48″	31.52
43″ x 48″	40.36
48″ x 60″	62.80

Lindberg Engineering Co.

228 NORTH LAFLIN STREET

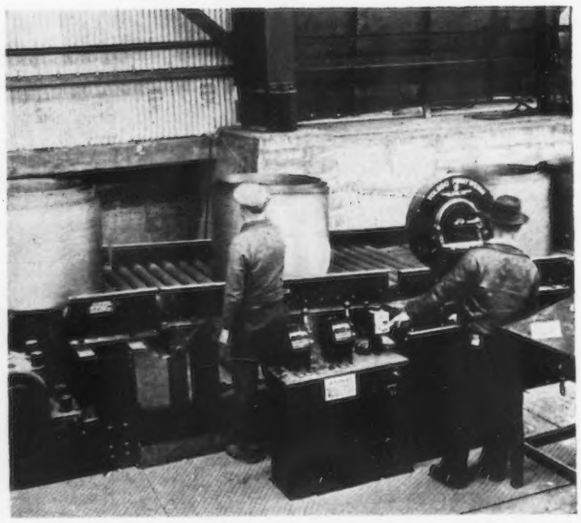
CHICAGO, ILLINOIS

Training Within Industry Division of the OPM, according to an announcement by O. W. Winter, National Chairman of the A.S.T.E. Committee.

A radical revamping of the defense training program in New York's Westchester County was seen as the result of formation of a new committee to supervise all such work. The committee is headed by J. J. Hogan, regional chairman of the Emergency Defense Training Committee, A.S.T.E., and comprises representatives of the New York State Employment Service, the WPA, industrial concerns, and the local Board of Education. Mr. Hogan is superintendent in charge of manufacturing of Otis Elevator Co. in Yonkers.

MINIMIZE *Worker Fatigue* WITH MATHEWS

● Productive manhours depends as much upon the condition of the man as it does upon the number of hours involved. Mathews can make the manhours in your plant more productive by speeding work and at the same time minimizing worker fatigue.



INCREASED CAPACITY FOR NATIONAL DEFENSE

Our plant capacity has been increased over 65% to care for the rising demands of the National Defense Program — plus the normal demands of peacetime production.
All orders, whether subject to Defense priorities or not, are given the same helpful care and attention that have always marked our dealings with prospects and customers in the past.

MATHEWS CONVEYER COMPANY
114 TENTH ST. - - - - - - ELLWOOD CITY, PA.
Field Engineers and Sales Offices located in 30 Industrial Centers.

Oil Producers to Cut Steel Used 20%

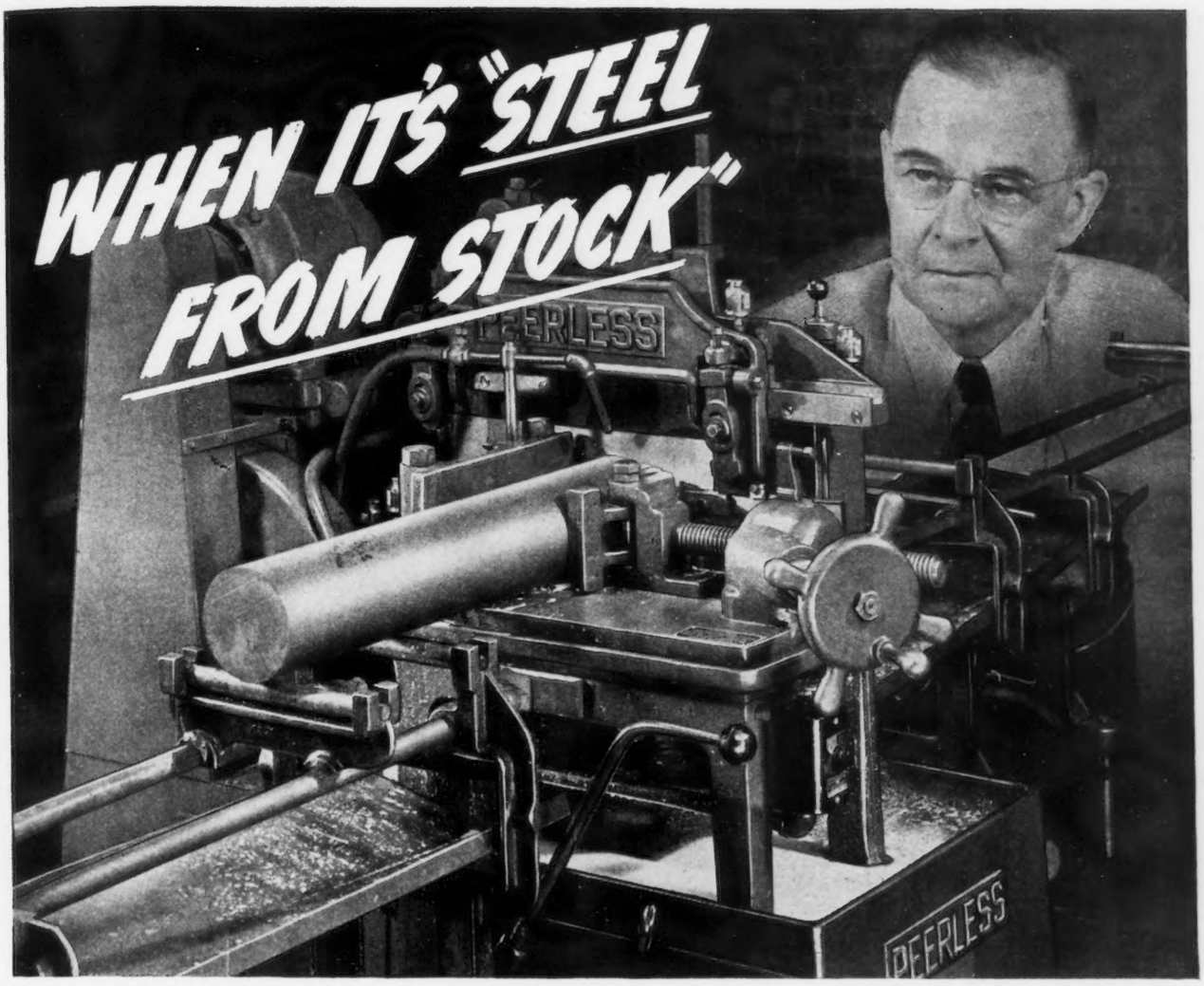
Washington

• • • **Savings of about 20 per cent** or 250,000 tons annually of the steel normally used in the producing branch of the oil industry is expected to be made through a program proposed at a meeting held here on Tuesday of last week at the request of OPM Conservation Chief R. E. McConnell. Attending the conference were representatives of the Interstate Oil Compact Commission and officials of the oil regulatory bodies of the principal oil producing states.

Mr. McConnell and Robert E. Wilson, chief OPM consultant on petroleum pointed out that conservation of steel would help make possible the construction of pipe lines and tankers to get needed oil supplies from the oil states to the eastern seaboard, thus helping to replace as soon as possible the transportation facilities represented by 50 tankers transferred to the British service.

The request for a 20 per cent conservation of steel is in line with the request made recently to the automobile industry for a reduction in its output. There was general agreement that substantial savings in steel could be made by encouragement of wider well spacing and unitization agreements and other methods of avoiding unnecessary drilling. Under unitization agreements, all the persons interested in a particular oil producing pool or area develop the property jointly, using the most efficient well spacing arrangment, and divide the output equitably among those concerned.

It was the opinion of most of the oil state representatives that full cooperation of oil companies, land owners and royalty holders would be necessary to accomplish maximum savings and that they should be acquainted fully with the need for the conservation measures. It was also pointed out that in the long run such a program should result in the recovery of substantially more oil per ton of steel used and per dollar invested.



. . . It's Gotta Be Cut Square . . . Right On the Line!

Ask any steel warehouse man—he'll tell you how vitally important it is to cut steel —when it's from stock—accurately, and why he prefers a Peerless Saw for the job.

For example, when a customer orders a 120-inch bar from which he expects to cut twelve pieces of a given length — the squaring cut must be straight as a die, otherwise the twelfth piece may be short and wasted.

Accurate cutting — with speed and extra blade life demands positive blade control . . . Peerless is the only Saw which is equipped with a Four-Sided Saw Frame — the frame that completely surrounds the blade and the work. This holds the blade with a tension and rigidity never before possible—prevents bowing—permits blade to lift and clear on every return stroke—and thereby lengthens blade life.

All this adds up to 25% faster cutting in day-in and day-out production. We shall gladly submit cutting-time estimates for your own regular or special types of metal sawing.

PEERLESS MACHINE COMPANY
Racine, Wisconsin

PERFORMANCE REPORT "J"

The 6½" x 6½" High Duty, with manually operated bar feed and stock rest, shown in action here in a steel storage warehouse, is cutting SAE 3145 bar stock . . . 4" in diameter . . . at a rate of 2 minutes per cut — 12.56 square inches—approximately 1500 square inches per blade. Steel sold from stock must be cut accurately.

Peerless
METAL SAWING MACHINES

PEERLESS MACHINE COMPANY, Dept. I A-6-41, Racine, Wisconsin

Mail cutting time estimate for.....

.....

- ☐ Mail catalog on Hydraulic type Saw for High Production Cutting
- ☐ Mail catalog covering Vertical type used for Die Block Work
- ☐ Mail catalog on Mechanical type Saw for production cutting
- ☐ Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City.....State.....

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

Toledo, O., Hopes to Be Aircraft Center

By D. R. JAMES

Toledo

• • • **Gradually moving into high** gear but nowhere near the peak which is sure to come—that describes industrial defense production here.

Direct contracts are in the neighborhood of $30,000,000 and sub-contracts probably amount to $40,000,000. Combined, the total is considerably below half a year's production for Toledo. It is expected at least $150,000,000 in defense orders will be placed here sooner or later.

Certain it is that Toledo's contributions to the program are important and that defense requirements are getting paramount consideration. Employment is up 25 per cent over a year ago. Thanks to the far-famed Toledo Industrial Peace Board, labor relations have been tranquil.

Recent events have aroused hope that the city may become an aircraft center. A $25,000,000 propellor plant, government financed and to be operated by the new American Propellor Corp., subsidiary of Aviation Corp. of America, has been announced. The first unit will be a plant of 500,000 sq. ft. employing around 2500 workers. William F. Wise, executive vice-president of Aviation Corp., will be president of the new Toledo company.

At the same time it was announced that the experimental plant of Aviation Corp. at the Lycoming division works in Williamsport, Pa., will be moved to a new plant in Toledo.

The propellor plant will make 2500 blades per month, a patented blade made of seamless steel tubing, formed to shape by gigantic presses.

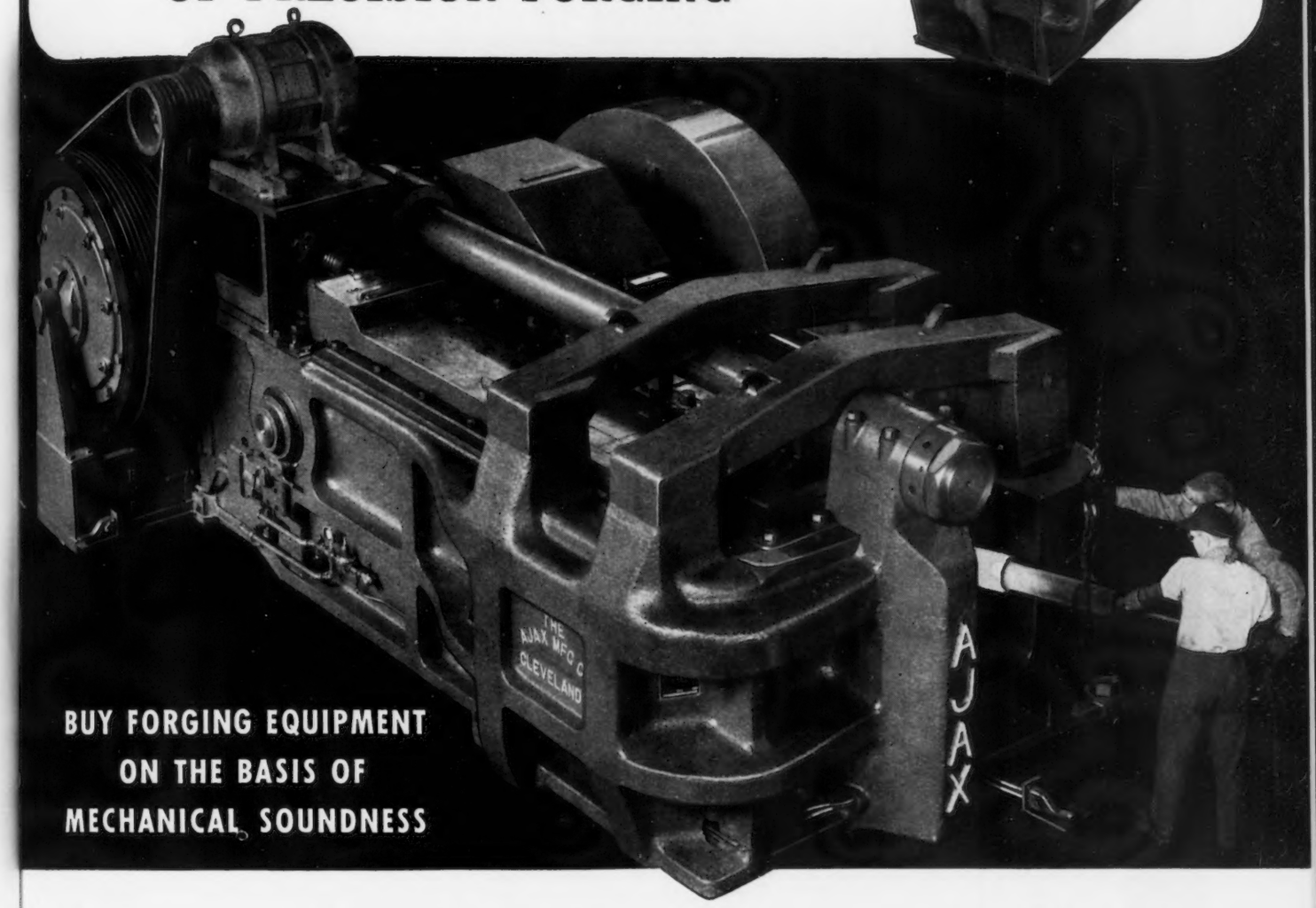
Two government-sponsored industrial training programs are under way with about 1500 persons enrolled. Hundreds have completed courses since July, 1940. With metal-working so predominant here, the biggest shortages involve machine operators.

Willys-Overland Motors is employing 4500 workers in its automotive and defense program. The company holds the greatest volume of direct defense awards here, including $8,820,000 for ammunition components; $6,000,000 for shell hoists; $2,000,000 for machine gun parts; and $600,000 for other defense items. A loan of $2,173,000 was granted the company recently for remodeling its steel forge plant to produce aluminum forgings for airplanes. At the same time, the company has scheduled 11,000 cars and trucks for production in second quarter, a 100 per cent gain over one year ago.

The newly developed small reconnaissance car, known as the "blitz buggy" is rolling off the production lines at Willys-Overland. These speedy little vehicles serve a multitude of purposes and can even be used as tractors to pull ammunition loads. With three

Flame Hardening...
A routine job for 10 years at NE
. . . Flame hardening of specialized gearing and castings has been routine at National-Erie Corp. for 10 years. You will profit by investigating National-Erie's capacity to meet your specifications for Flame Hardened Steel Castings, under one control from raw material to finished product.
NELOY and NELOY-Molybdenum Steels were developed in the National-Erie Metallurgical Laboratory to be readily adapted for Heat Treating by the Flame Hardening process. Their improved qualities over carbon steel improve the machining performance.
NATIONAL-ERIE
• CORPORATION •
ERIE, NE PA., U.S.A.

ONE-PIECE SOLID STEEL BED FRAME of AJAX Air Clutch Forging Machines is the FIRST ESSENTIAL OF PRECISION FORGING



BUY FORGING EQUIPMENT ON THE BASIS OF MECHANICAL SOUNDNESS

THE rigid bed frame of AJAX Forging Machines with liberally proportioned metal scientifically distributed for maximum effectiveness is the very foundation for the precision forging of which these machines are capable.

Minimum bed frame length between die seat and crankshaft minimizes stretch and the large diameter lengthwise tie-rod over the die slide way gives the moving die and stationary die equally good lengthwise support against tremendous heading or upsetting pressures. Continuous crankshaft housings bridged by heavy horizontal crown rib, exclusive on AJAX Machines, prevent crankshaft deflection and combine to hold flanged forgings to uniform thickness and accurate lengthwise dimensions.

Crosswise rigidity necessary to prevent spreading of the gripper dies and formation of flash, and to hold forgings within close concentricity and diameter tolerances is supplied by deep C-clamp transverse ribbing beneath the feed gap on machines up to the 5-inch size. On 6-inch machines and larger with their tremendous grip pressures and great die height, adequate additional rigidity is guaranteed by overhead transverse frame clamps introduced by AJAX and installed in a manner to overcome any interference with die setting.

Anvil-like frame rigidity, continuous crankshaft housings, lengthwise tie rod and the cross tie clamps of larger machines are factors which should weigh heavily in your selection of AJAX Forging Machines purely on the basis of mechanical soundness. Write for Bulletin 65A.

THE AJAX MANUFACTURING COMPANY

621 MARQUETTE BLDG. CHICAGO, ILLINOIS

EUCLID BRANCH P.O. CLEVELAND, OHIO

201 DEWART BUILDING NEW LONDON, CONN.

4 WAYS to IMPROVE your ABRASIVE BLAST CLEANING PERFORMANCE

THINK of your blast cleaning machine as a rapid-fire gun for a moment. It shoots thousands of abrasive "bullets" each second. Its effective cleaning action depends upon the quality and quantity of ammunition that can be discharged in a given period of time. If useless fines are permitted to weaken the charge there is bound to be a low score on effective hits—it is going to take longer to reach the objective—and it is going to cost more to do it. By keeping the abrasive clean you can:

FIG. A

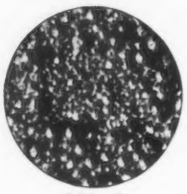


FIG. B

Views showing clean abrasive (Fig. A) and abrasive contaminated with useless fines (Fig. B).

1. **Reduce Cleaning Time** — because there is more real abrasive at work. We have known instances where failure to keep foreign matter out of abrasive increased cleaning time as much as 50%.
2. **Lower Cleaning Costs** because clean abrasive does the job faster.
3. **Improve Cleaning Quality** because clean abrasive has more striking power—it does more effective work.
4. **Reduce Wear On Equipment** because sand wears out equipment much faster than metallic abrasive.

The key to clean abrasive is proper ventilation. Hundreds of foundries have discovered that American Dust Control, (using either the "Dustube" or the "Cyclone") is the profitable solution to this problem because it is extremely efficient, low in cost, and simple to operate and maintain. Get the facts today—we will gladly send you literature and data without obligation.

AMERICAN FOUNDRY EQUIPMENT CO.
510 S. Byrkit St. Mishawaka, Indiana

DUSTUBE DUST COLLECTOR

AMERICAN DUST CONTROL

CYCLONE DUST COLLECTOR

TANK TERRIERS: Toledo's important contributions to national defense include hundreds of small

men and a machine gun, speeds of 70 miles per hour have been attained.

The cars, of which Willys has an order for 1500 and for which it expects to receive many more awards, enable military forces to bridge the gap between heavy advance units and infantry. The power plant, with special carburetor and manifold, develops 61 hp. at 3800 r.p.m. Four-wheel drive mechanism is supplied. Through a special transmission lever an additional gear reduction may be applied, so that it is possible to obtain a total of six forward speeds and two in reverse.

It is claimed a cruising radius of 175 miles can be obtained on a single 12-gallon tankful of gas. The wheelbase is only 80 in., but the car has exceptional road clearance with low center of gravity.

At the Spicer Mfg. Corp. 2000 workers are employed on some $12,000,000 in parts for the defense program. The company has bought new equipment heavily and turned office quarters into production space.

Spicer is making transmissions, universal joints, front propellor shafts and transfer cases for half-track scout cars; powerful and complicated transmissions for the light M2A4 tank; propellor shafts for the mosquito boats of the Electric Boat Co. Many of the parts, axles, shafts and transfer cases for the "blitz buggy" were conceived, designed and are being built by Spicer employees.

It is estimated that three-quar-

military cars, like that shown above, capable of traveling 70 mph. and small enough to be transported by plane.

ters of Spicer's production is devoted to defense work. A new $350,000 building is being erected.

Champion Spark Plug Co. recently received a government award for $1,500,000 in spark plugs. Doehler Die Casting; Surface Combustion; Acklin Stamping; Baker Bros. Inc.; City Auto Stamping; Bunting Brass & Bronze; DeVilbiss Co.; Etna Machine; Unitcast Corp.; Kent-Owens Machine Co.; Toledo Scale Co.; Electric Auto-Lite and all the other principal plants, of which there are plenty here, are involved in the defense program

Shipbuilding is coming back in a big way here. One of the most vital contributions to the defense program by Toledo is being made through its port, the largest bituminous coal port in the world, and a heavy handler of iron ore, petroleum, grain, etc.

Fortunately, Toledo started several years ago construction of a new water intake system which brings water from Lake Erie instead of pumping it from the Maumee River.

Industrial Milestones

• • • **Buda Co.**, Harvey, Ill., celebrated two anniversaries—its 60th year of existence and its 50th in its present site after moving here from Buda, Ill., 120 miles southwest of Chicago. From a start with only 20 employees, Buda today has a payroll of 1700.

HOLD THAT HEAT

WITH Carey HI-TEMP INSULATIONS

For High Temperature Surfaces 1000°F. to 2500°F. . .

CAREY Hi-Temp Insulations were developed specifically for insulation of boilers, tanks, towers, breechings and other surfaces where temperatures range as high as 2500°F.

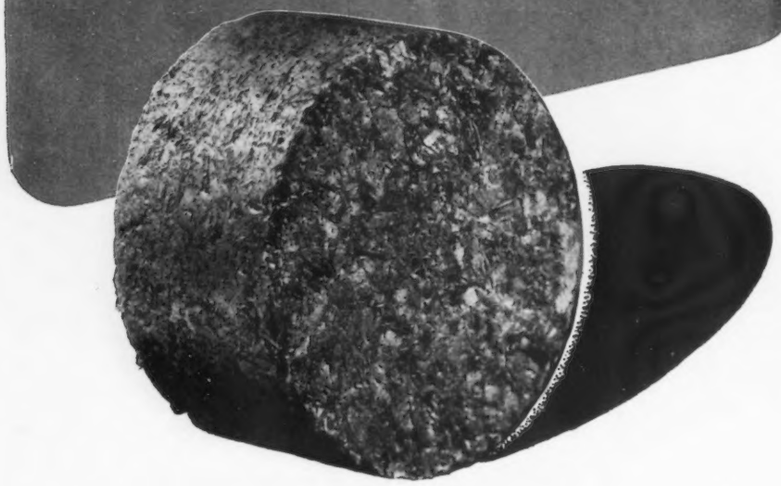
These special compounds of heat resisting materials are the TOP in insulating efficiency, high in impact strength, low in heat shrinkage—have the qualities to resist the decomposing effects of long exposure to extreme temperature.

Correctly applied in the proper thicknesses, CAREY Hi-Temp Insulations insure the lowest possible heat loss—the highest possible fuel savings.

Let CAREY engineers check your equipment for avoidable heat losses, or make recommendations for new equipment. No cost or obligation. Write for Insulation Catalog, Department 26.

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
IN CANADA: THE PHILIP CAREY COMPANY, LTD. Office and Factory: LENNOXVILLE, P. Q.

BRIQUETTE
BORINGS *and* TURNINGS

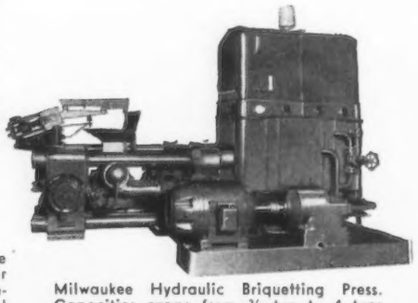


Convert Your Metal Scrap Into
MAXIMUM USABLE MATERIAL

Help the cause of National Defense by reclaiming the highest percentage of usable material from your metal scrap.

Salvage it the modern Milwaukee way. Melt borings and turnings in a briquetted form. It enables you to conserve both materials and space, at the same time effecting substantial savings in production costs.

Milwaukee Hydraulic Briquetting Presses convert metal swarf of all kinds into solid metal briquettes that replace the highest grades of metal scrap. Used by the leading manufacturers.



Milwaukee Hydraulic Briquetting Press. Capacities range from ¾ ton to 4 tons per hour.

Our engineers will be glad to give you their recommendations for reclaiming YOUR metal scrap. Write us—today.

MILWAUKEE
FOUNDRY EQUIPMENT CO.
3238 W. PIERCE ST. • MILWAUKEE, WISCONSIN

Pay Instead of Vacations For New England Workers

Boston

• • • **Howard M. Hubbard, president** and general manager of the Greenfield Tap & Die Corp., Greenfield, Mass., says that in view of the maximum production requirements on defense contracts, it will not be possible to close down the plants for vacation. However the company plans a cash vacation bonus.

Employees of the Van Norman Machine Tool Co., Springfield, Mass., will have their vacation week starting June 29, but 65 per cent of the workers have indicated they will continue to work that week and will collect double pay instead.

State Labor Board Rules Against Allis-Chalmers Union

Milwaukee

• • • **The Allis-Chalmers CIO** union and its president, Harold Christoffel, have been found guilty of unfair labor practices by the Wisconsin employment relations board in a decision handed down as the result of a complaint filed by two AFL employes at the plant. The union and its head were ordered to "cease, desist and stop" attempting to coerce and intimidate Allis-Chalmers employees from carrying out their legal right freely to choose their own collective bargaining agent.

Revere Gives Defense Prize For Blind Landing System

• • • **Revere Copper & Brass,** Inc., announced June 1 that first prize of $5000 in their contest for the best contributions made by workers at the bench to America's military and industrial defense plans had been awarded to Eugene Phillips, Fort Worth, Texas, designer of a system of blind landing for airplanes. Phillips had been working on his system for seven years. William R. Holcomb, Burbank, Cal., won second prize of $2500 in the $10,000 contest, for his invention of an electro-magnet riveting gun. Third prize of $1000 for a structural design eliminating the use of rivets and clips was awarded Oscar B. Liebst, Seattle, Wash. Six additional awards of $250 each were given by the company.

April Hourly Steel Wages Average 97.4c.

• • • Payrolls of the steel industry in April amounted to more than $108,557,000, an increase of more than $10,500,000 over March, according to the American Iron and Steel Institute. (The sharp rise reflected the 10c. an hour increase in wages which became effective April 1.)

Employment in the industry likewise rose during the month, establishing a new peak of 621,000 or 8000 over the previous peak of 613,000 first recorded in the summer of 1937 and again in March of this year. A year ago, in April 1940, an average of 503,000 was employed in the steel industry, and payrolls totaled $67,724,000.

Hourly earnings of wage-earning employees in the industry averaged 97.4c. an hour in April, compared with 87.7c. an hour in March before the increase went into effect. In April of last year, steel wage earners received an average of 83.6c. an hour.

An average of 39.4 hr. per week was worked by wage earners in April, as against 38.5 hr. per week in March and 33.4 in April 1940.

705,000 Get Jobs in April, Reducing Idle to 5,412,000

New York

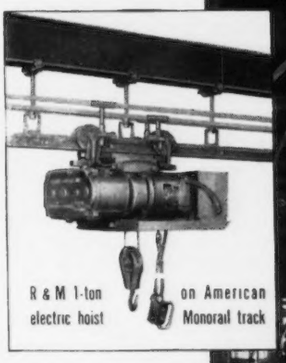
• • • **A drop in unemployment** of 705,000 in April reduced the total number of jobless to 5,412,000, the lowest for any April since 1930, when fewer than 3,000,000 were without work, according to The Division of Industrial Economics of The Conference Board. The month's increase in employment was 752,000 and brought total employment to 50,150,000, the highest figure on record.

Railroad Group Considers Use of Wood in Freight Cars

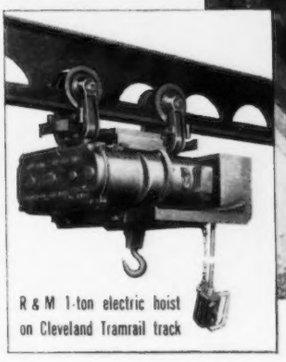
Washington

• • • **While the OPM was understood** to be planning to issue steel priority certificates to railroad car builders, the Association of American Railroads announced last week that delay in obtaining sufficient steel had prompted investigation by its mechanical section of the use of wood in the super-structure of freight cars.

Up goes Production WITH R & M MONORAIL HOIST



R & M 1-ton electric hoist on American Monorail track



R & M 1-ton electric hoist on Cleveland Tramrail track

R & M hoist on Louden Monorail in manufacturing plant producing stampings and small castings

WHEN the powerful hook of an R & M Monorail hoist gets down to business, *up* goes production! This remarkably compact hoist produces maximum lift in a minimum of headroom space. Symmetrical design provides precise balance and load suspension at all times . . . the position of drum in frame allows lifting from anywhere within hook reach without cable-winding interference.

Fits Any Type of Monorail

R & M hoists are designed to fit any make of monorail now installed in your plant. Let an R & M hoist expert study your setup and show you how quickly you can speed material handling without altering your present layout.

The R & M Monorail is one of 2,000 standard types of R & M hoists and cranes ranging from ¼-ton bantams to 10-ton huskies . . . built from the ground up in one plant . . . famed in every industry for service reliability.

Contact your nearest R & M sales and service office listed below or write the factory for time- and money-saving hoist and crane details. It will pay you to "take it up" with R & M.

Albany . . . . . 364 Broadway
Atlanta . . . . . 909 Myrtle St.
Boston . . . . . 55 Long Wharf
Buffalo . . . . . 2005 Delaware Ave.
Chicago . . . . 2400 W. Madison St.
Cincinnati . . . . . 418 New St.
Cleveland . . 352 Rockefeller Bldg.
Denver . . . . . 1424 16th St.
Detroit . . . . 2921 E. Grand Blvd.
Houston . . 4715 Harrisburg Blvd.
Jacksonville . . . . 305 Bisbee Bldg.
New York . . . . . 200 Varick St.
Newark . . . . . 700 Bergen St.
Philadelphia . . . 401 N. Broad St.
Pittsburgh . . . . . 705 Oliver Bldg.
San Francisco . . 237 Rialto Blvd.
Seattle . . . . . 216-17 Walker Bldg.
Syracuse . . . . . 304 Tower Bldg.
Montreal . . . . Lyman Tube & Supply Co., Ltd.

ROBBINS & MYERS, Inc.
HOIST & CRANE DIVISION • SPRINGFIELD, OHIO
MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

Trade Notes . . .

Cannard Co. has been organized at Little Chute, Wis., to operate a foundry and machine shop. Incorporators are Carl F. Hofmeister, Genevieve Williams and F. E. Jenkins. Offices are at 710 Plankinton Avenue, Milwaukee.

•

Vultee Aircraft, Inc., 218 Boulevard Building, Detroit, announces that the Research Division, Aviation Mfg. Corp., has been transferred to Vultee Aircraft, Inc., where it will be known as the Manufacturing Research Department.

•

Chicago office of the Evanston Stamping Co., formerly Nilles Stamping Co. and Warren H. Hungerford, is being discontinued and transferred to a new factory addition at Evanston, Ill.

•

The Detroit Ball Bearing Co., Detroit, has established a new branch at 127 S. Water Street, Saginaw, Mich., where a complete stock of ball and roller bearings is maintained. With the various lines of bearings that are handled for industrial replacements the Saginaw Branch also carries pillow blocks and other mounted units along with such allied products as oil seals, lock nuts, and special anti-friction bearing lubricants. W. C. Thompson, manager of the Saginaw branch, was formerly in charge of the Grand Rapids branch where he is succeeded by E. J. Moore.

•

Joseph B. Kushner, metal finishing consultant and engineer, has moved his laboratories and offices to larger quarters at 114 E. 32nd Street, New York.

•

Airesearch Mfg. Co. has moved its office and plant from 1740 Standard Avenue, Glendale, Cal., to 9851-9951 Sepulveda Boulevard, Los Angeles Municipal Airport, Inglewood, Cal.

•

Calco Machinery Co., 1420 Chestnut Street, Philadelphia, has been appointed exclusive agent for Kent-Owens milling machines in that territory.

•

Eaton Metal Products Corp., 13th and Willis Avenue, Omaha, Neb., has been incorporated by A. N. Eaton, president and treasurer. J. R. Davis is manager of the Denver plant and vice-president; H. D. Marshall, sales manager and vice-president, and E. V. Clausen, superintendent and assistant secretary.

•

Ray J. Thompson, eastern district manager of Ampco Metal, Inc., Milwaukee, has changed his office address to 57 White Avenue, West Hartford, Conn. Mr. Thompson has supervision over Ampco field offices at Springfield, Mass., New York, Philadelphia, and Washington.

American Engineering Co., Philadelphia manufacturers of Lo-Hed Hoists, announce the following appointments. George C. Lever Co., 50 Church Street, New York, and 972 Broad Street, Newark, N. J., for Northern New Jersey, greater New York and Long Island; George J. Sturmfelsz, 1208 Southview Road, Baltimore, Md., for the State of Maryland; H. E. Mensch, 424 Book Building, Detroit, for Detroit; American Steel Export Co., 347 Madison Avenue, New York, as foreign sales representative.

•

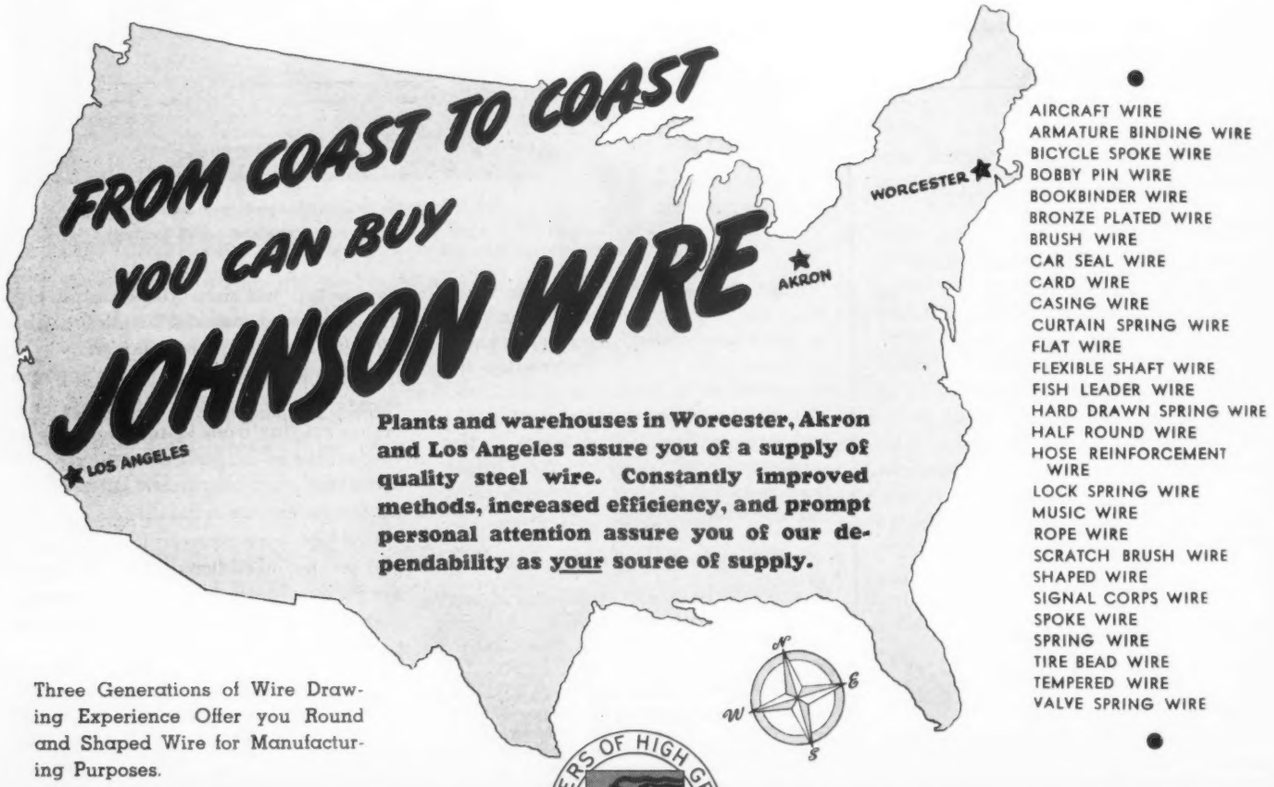
The research department of Aviation Mfg. Corp., directed by Peter Altman, has moved into quarters at 218 Boulevard Building, Detroit. It will occupy these quarters for some months pending construction of quarters at the Stinson plant, Wayne, Mich. A new building to house administration offices and engineering personnel also is being erected by Stinson at Wayne.

•

N. Ransohoff, Inc., Cincinnati, has moved to a new plant at Township Avenue and Elmwood Place, that city. The new plant, with 80 per cent greater capacity than the old, makes tumbling barrels and metal cleaning and washing equipment. N. Ransohoff is president and Julius W. Freiberg secretary-treasurer.

•

Peerless Pump Division, Food Machinery Corp., has moved to 1250 Camden Avenue, S. W., Canton, Ohio. All of the company's Eastern operations are now conducted from this plant.


FROM COAST TO COAST
YOU CAN BUY
JOHNSON WIRE
WORCESTER
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Plants and warehouses in Worcester, Akron and Los Angeles assure you of a supply of quality steel wire. Constantly improved methods, increased efficiency, and prompt personal attention assure you of our dependability as your source of supply.
AIRCRAFT WIRE
ARMATURE BINDING WIRE
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CAR SEAL WIRE
CARD WIRE
CASING WIRE
CURTAIN SPRING WIRE
FLAT WIRE
FLEXIBLE SHAFT WIRE
FISH LEADER WIRE
HARD DRAWN SPRING WIRE
HALF ROUND WIRE
HOSE REINFORCEMENT WIRE
LOCK SPRING WIRE
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Three Generations of Wire Drawing Experience Offer you Round and Shaped Wire for Manufacturing Purposes.
MAKERS OF HIGH GRADE
Steel Wire
JOHNSON STEEL & WIRE COMPANY, INC.
P. O. BOX 1211-MAIN OFFICE & PLANT WORCESTER, MASSACHUSETTS
BRANCH PLANTS AND WAREHOUSES AKRON, OHIO • LOS ANGELES, CALIF.

309,000 Men Needed By U. S. Shipbuilders

Washington

• • • **Employment in major** defense industries, while well ahead of that of a year ago, will have to be increased substantially if the program is carried out on schedule, the OPM Labor Division estimates. For example, it was found that 117,000 workers employed in aircraft when the defense effort began would have to be increased by successive steps to 390,000 in order to live up to our schedule. Shipbuilding, which started with a small payroll and employs 250,000 workers today, must have an additional 309,000 skilled men within 18 months. Employment in the iron and steel industry rose to 560,000 in March, 1941, from 443,000 in March of last year.

Employment already has risen sharply under the spur of defense production. Total non-agricultural employment in April reached 37,617,000, the highest level on record. There were 2,735,000 more workers in non-agricultural jobs in April 1941, than in the corresponding month of 1940, and 1,454,000 more than in April, 1929.

Following are employment figures in 15 key defense industries as selected by the Burea of Labor Statistics:

	May, 1940	*April, 1941*
Aircraft engines	21,400	44,300
Aircraft and parts (exclusive of engines)	74,900	166,100
Shipbuilding	86,100	157,800
Machine tools	62,600	89,600
Machine tool accessories	32,900	50,600
Screw machine products	19,400	29,900
Abrasives	8,900	13,400
Instruments (professional, scientific)	19,900	29,900
Optical goods	13,600	18,100
Aluminum manufactures	26,500	34,300
Brass, bronze and copper products	81,700	118,800
Foundries and machine shop products	383,600	506,000
Electrical machinery (apparatus and supplies)	226,600	326,900
Blast furnaces, steel works, and rolling mills	443,400	560,000
Smelting and refining copper, lead, and zinc	29,000	34,300
Total	1,530,500	2,179,900

Export Control by U. S. Extended to Philippines

• • • **Control of the export** of strategic and critical articles and materials needed in the national defense program was extended last Friday by proclamation of President Roosevelt to the Philippine Islands as the President signed a joint resolution of Congress authorizing such extension.

THE ANSWER TO THE NATION'S STEEL FINISHING PROBLEMS

PENTRATE

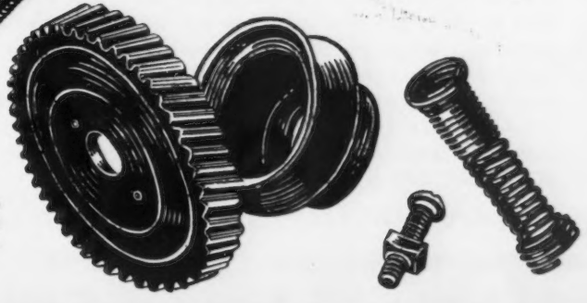
PATENTED

PHYTANIUM BLENDED *

The Penetrating BLACK *finish for* STEEL

Hundreds of manufacturers of steel products are turning readily to PENTRATE for a durable, attractive black finish. The important rust retarding and friction reducing qualities of Pentrate warrant your investigation immediately. This patented process fits quickly into your production line. Material shipped promptly from stock in any quantity. We'll gladly process samples of your products. A great many defense contracts recognize the merits of Pentrate.

Send to-day for *Free* 18 page PENTRATE BOOKLET



* Phytanium Blended is a specially developed method of dehydration and blending of Pentrate materials, assuring constant uniformity and eliminating the necessity of energizing or replacement due to "breakdown."

HEATBATH CORPORATION - SPRINGFIELD, MASS.

50,000 Airplanes

[CONTINUED FROM PAGE 47]

ing automobile motor buildings. And so new will be the operations employed in the production from the standpoint of automotive labor, that a school, which in scope and equipment amounts to a veritable University of Production, is being incorporated as a major plant department.

There is little doubt but when the history of war production is written, the construction, equipping and getting into production of this plant will go on record as an out standing example of efficiency of timing, the only minutes lost having been those lost through strikes.

In the airframe parts plant of the body builder, the building is new and specifically designed for a single purpose—airframe construction. Some equipment, as for instance spot welders and presses, has been carried over from the body departments, but on a whole there is no resemblance whatever to body building as regards production layout, handling and jigging.

Now the point the writer is attempting to establish is that in these two examples of engine and airplane production, which are typical of what the automobile industry has to do, *not one square foot of existing automobile production capacity has been or probably will be utilized.* This may be an eye-opener to a good many arm-chair production men and wishful thinkers. It also may raise the question as to why the automobile people are being turned into the airplane builders if their great existing production capacity cannot be utilized.

The automobile technicians are very much needed—needed because of the way they think, and what they have done has made it neces sary for them to think. They are needed because they are not afraid of mammoth undertakings. They have learned to tame enormous jobs. They are needed because they have learned to simplify and thus to solve complexities; how to divide and thus to multiply; how to cooperate and thus to successfully compete.

The automobile industry has already gone through the mill of expansion that the aircraft business is about to go through, and for that reason the automobile technicians have a skin hardened by this experience. They are needed because there is an almost impossible job to do and because the motto of the automobile industry has always been: "It can't be done so let's do it!"

All this is set forth with no desire whatsoever to reflect in any way upon the past performance or present capabilities of brother technicians in the aircraft industry. The aircraft engineers have displayed splendid performance within the limitations that have been set upon them by circumstances. Perhaps under similar circumstances automobile technicians would not have done even so well. Up to now, the aircraft industry has largely been in the state of experimental

EVERY METAL SHOP CAN NOW AFFORD

ROTOBLASTING

(IN FACT—CAN'T AFFORD NOT USING IT!)

★ ★ FOR SPEED ★ ★

"ROTOBLASTING" means faster cleaning—faster removal of sand and scale—and faster delivery of finished product. Excuses and apologies are worthless today—only performance and delivery count. If your shipments are delayed because of blast cleaning slowness, your customers will buy from plants they can depend upon. They will buy from plants that ROTOBLAST their work to assure leadership in blast cleaning. That's why the army of Pangborn airless Barrels, Tables and Special Machines is growing so rapidly. ROTOBLASTING is SPEEDY!

★ ★ FOR ECONOMY ★ ★

"ROTOBLASTING" is economical! When cleaning time is cut 2 or 3 hours per day—when one man finishes in half a shift what five men formerly did in their combined full time—when power and labor and wear are all reduced to a fraction of their previous cost—that's economy! ROTOBLAST economy.

More work is better cleaned—in quicker time—at less cost per ton—than ever before. Less fuss and bother. More production. Less dollar cost. No wonder installations are gaining so rapidly. ROTOBLASTING is ECONOMICAL!

Send for descriptive literature today

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION . . . HAGERSTOWN, MARYLAND

German Plane Engines on Par with U. S. Types

Washington

• • • Contrary to popular opinion, German airplane engines are fully as well built as American or British engines, as far as workmanship is concerned, an aeronautical expert who has studied a German radial engine shipped here by the British told THE IRON AGE.

Tolerances on the German engine appeared to be fully as strict as those on American engines he said, but the effective life of the engines probably was not as great as American models due to an apparent shortage of certain vital alloys.

It is untrue, the expert said, that German planes are built for only one trip. The engine being studied by aviation technicians here was shot down in England but was undamaged except for a few bullet holes in the crankcase.

The large number of aircraft being produced in Germany was described as being due purely to the employment of mass facilities. They apparently have devised no production short cuts not known to American manufacturers, it was said, but have devised several assembly tricks which were of interest to American producers.

The experts studying the engine were able to name the type of equipment used in most of the various machining operations by the characteristic tool marks left on the machined pieces.

design. It practically has had the aspect of a large laboratory with a small production annex. The Army and Navy have played important parts in this laboratory. Together, the aircraft builders and the military have amassed a knowledge of design principles and requirements that the automobile industry could not hope to duplicate in a generation.

As the automobile industry becomes acquainted with the aircraft industry, it will find that aircraft production methods have been just as up-to-date in view of the quantities being handled. Men are more efficient than conveyors when the task is to move a few dozen pieces per day through a department, and mechanical dies do not mix with stop orders.

The influence the automobile industry is likely to have upon aircraft design will be in the results that will come as aircraft design engineers and automobile tool engineers become more sympathetically acquainted with each others' viewpoint. Through such liaison will undoubtedly come better appreciation by the automobile industry of the necessity—the life and death necessity—of many of the things that constitute what might be called "fussiness" but which have sound reasons back of them. On the other hand, aircraft engineers will quite likely form a better appreciation of the production possibilities involved in feasible simplification, minor changes for greater ouput, and the establishment of innumerable production lots.

Briggs is showing the way to the use of mechanical dies in the production of airframe parts, thus getting away from the drop hammer and the rubber die technique

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so cleverly worked out for short-run operation but which, nevertheless, requires enormous press capacity and considerable time-consuming handwork afterward.

Certain members of the automotive industry have succeeded in gaining acceptance of rolled threads instead of ground threads, and vast improvement is almost inevitable for the abolition of the many thousands of rivets in modern aircraft in favor of improved spotwelding techniques.

Packard is nearing completion of this heroic job of mechanizing the producing of the Rolls Royce engine. So effectively has the progressive assembly system schedule been worked out, that there will be but 35 min. available for final mechanical inspection of the motor as it nears the end of the assembly line. An even more important contribution of the automobile industry has been the quick elimination of "two-legged" shop drawings in airframe construction. The two-legged shop drawing is the liaison man from the engineering office of the aircraft designer who runs down to the shop to explain what a drawing means when the production man cannot interpret it. The automobile industry is familiar with this two-legged shop-drawing, as he was a fixture in every shop when the industry was small. Today, the automobile industry has thrown out the two-legged shop drawing and has replaced him with complete sets of detailed working drawings on which all limits and all changes are recorded. Such drawings when sent to the subcontractor or supplier enable him to know exactly what is wanted and how it is to be made so that all parts will fit together on the assembly line.

Up to now the aircraft industry, dealing in small lots and not interested in suppliers or subcontractors, has been largely dependent upon the "loft" system similar to that employed in shipbuilding. A huge layout may be prepared on sheet metal showing the principal outlines. Templets are laid out from this outline when necessary and have been the only pieces of concrete information transmitted to the shops. Of course, there were

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SPRING BRACKET — For trailer, made of several pressed steel plates welded to form the assembly shown. Lighter and Stronger.

CANADA MAKES A TANK: Shown here is the first heavy tank, a 25-tonner, rolling away from the Angus shops of the Canadian Pacific Railway at Montreal. The tank has a

some sketches, but practically nothing that could be identified as a detailed or assembly drawing.

To bridge the gap, aircraft makers developed large crews of intra-departmental engineers to explain what the designers really had in mind.

Murray and Briggs both have contributed largely to the modernization of this system. The former is expending $30,000 alone in the construction of working drawings of the inner wing panel that it will make for Douglas. The latter has sent a crew of its draftsmen to the Vought-Sikorsky plant to make similar drawings of the parts it has engaged to produce.

Another vitally important help to the aircraft industry will come from the utilization of the knowledge the automobile industry has obtained in the advantages of subcontracting. The practice of aircraft makers in this respect has not been any too satisfactory.

Thus, through its association with the automobile industry aircraft makers will certainly learn to turn out planes faster and the automobile industry will learn how to make better aircraft.

That in itself ought to make the joint effort self-liquidating and worth while, aside from its necessity. But there is an even greater economic benefit to be derived. It is certainly true that the benefits of mass production, hitherto largely confined to huge production lots, will be applied to much smaller quantities. It is quite possible that from what is learned innumerable products will be made in the future at substantially lower costs. This is to the benefit of all American consumers and to the reinforcement of our competitive position.

The writer would like to emphasize again one additional effort based on the result of 30 years' observation of the metals industry. Aside from, and in back of the technique of management and organization developed in Detroit, there has been one other outstanding factor of growth and success. It has been the free interchange of ideas within the industry. That is what will be imperatively needed

top speed of 20 mph. All its 14,000 parts except the engine and transmission were manufactured in Canada. Into it went 200 pieces of armor plate. (Passed by Canadian censor.)

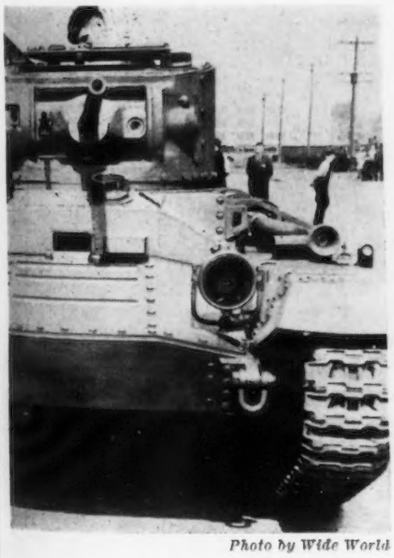
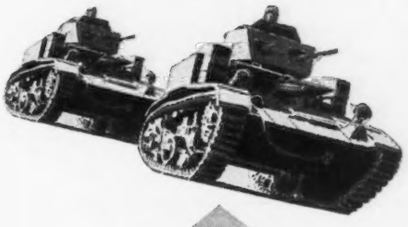


Photo by Wide World



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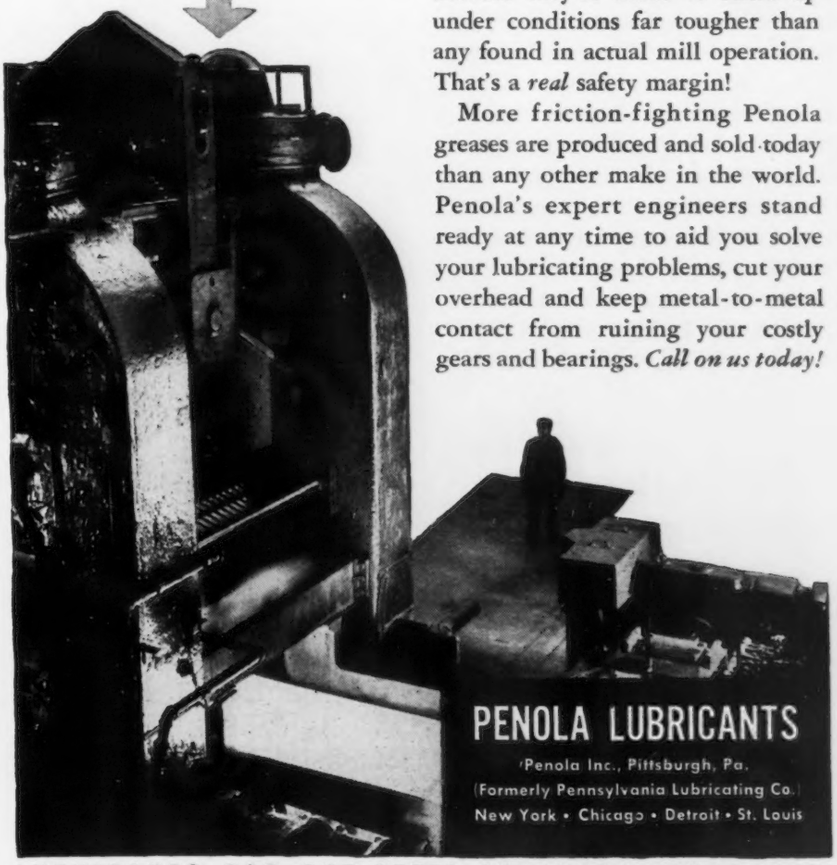

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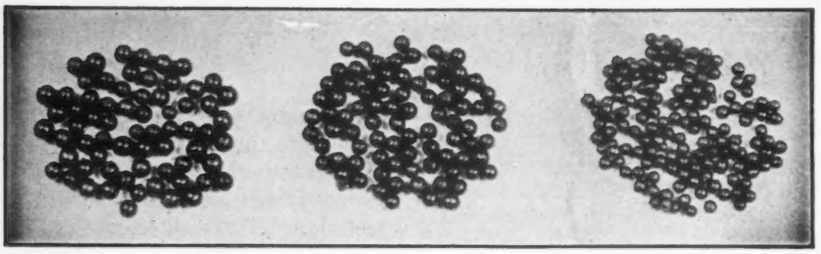

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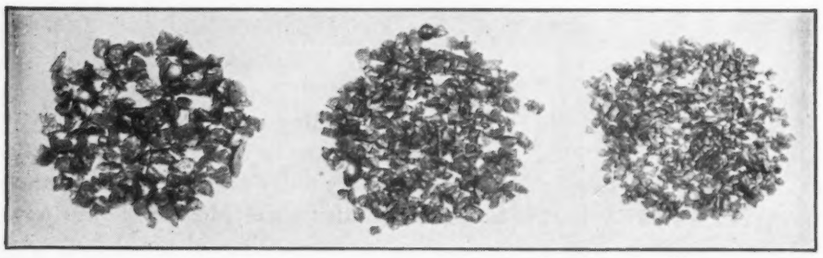

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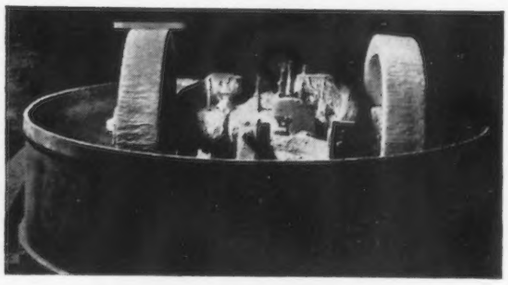

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in the automobile-aircraft set-up. In this set-up as now established there are a series of parallel lines each with an automobile maker at one end and an aircraft maker at the other. Information will naturally flow freely along these parallel lines. It seems to me that it should also flow as freely across them from one line to the other. There was such a set-up in the Automotive Committee for Air Defense, which under the direction of C. C. Carlton functioned so effectively in getting things started, but having completed its appointed task has now disbanded. Normally in peace times it is part of the function of the technical press to spread new ideas from industry to industry. This cannot be efficiently done today, however, because a great deal of the work being done is of confidential military character. It is the writers' belief that the Society of Automotive Engineers could perform a very important function by setting up such a committee for this purpose by having observers at both ends of the parallel lines. A committee of this type could couple them together by distributing this information as it is received.

A word about the labor situation as it affects this great program may not be amiss. It has been said that the trouble with American labor, and American industry, too, is that it has not as yet achieved a true fighting spirit. Anyone who believes this should go to Detroit to have his eyes opened. The trouble with labor, as the writer sees it, is not that it lacks fighting spirit, but simply that it chooses to fight the wrong party. It is fighting the employer and the American defense program instead of fighting those men symbolized by Hitler.

At the beginning of this article a promise was made to say a few words as to who is going to own the American airplane industry after the shooting is over. The writer does not think that the automobile industry wants to own it. The men in Detroit, and elsewhere, are set up to make and sell cars and trucks, and they have never succeeded in making any real money in trying to make and sell anything else, including tractors. It is difficult to visualize airplanes being sold by automobile dealers. Furthermore, the writer believes in a much more promising future for the motor vehicle.

It is doubtful whether the aircraft industry is worrying much

about this question either. Aircraft makers know that automobile makers have a long start as regards production technique. They themselves have an equally long start in the matter of aircraft engineering.

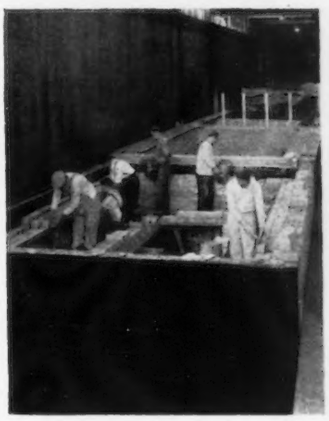
But in case anyone in either group is concerned about these possibilities, the writer would like to advance a personal opinion. It is simply this: If the country does not carry out the program laid down before it, neither the aircraft nor the automobile industries will own it. Mr. Hitler will—either directly or through stooges whom he seems to find so easily in any country. But, from what the writer has seen recently in peering through many knot-holes in Detroit and the West Coast, and elsewhere, he is confident that Mr. A. Hitler will not take over either the country or the automobile-airplane industry, and all American industry will come through with colors flying.

Aircraft Problems Dominate Metal Congress

[CONTINUED FROM PAGE 59]

modified martensite structures with hypoeutectoid ferrite; (3) importance of hardenability tests as a means for controlling heat treatment and analysis; and (4) relations of hardenability tests to quenched structures. Mr. McQuaid stated that carbon can safely be carried five to ten points higher in medium grained steels than would be considered satisfactory for coarse grained steels, and this increased carbon would improve hardenability and quenched structures, especially at the surface, where many machine parts are most highly stressed. Carbon content close to eutectoid results in surface having the best strength and highest ductility, but, it was pointed out, this advantage may be offset by internal stresses in small or non-uniform sections.

Various types of quenching mediums and procedures were discussed, along with results to be expected from their use. For maximum properties at high hardness, the steel should be heated long and high enough for a high degree of chemical uniformity in the austenite solid solution, then quenched fast enough so that excess ferrite



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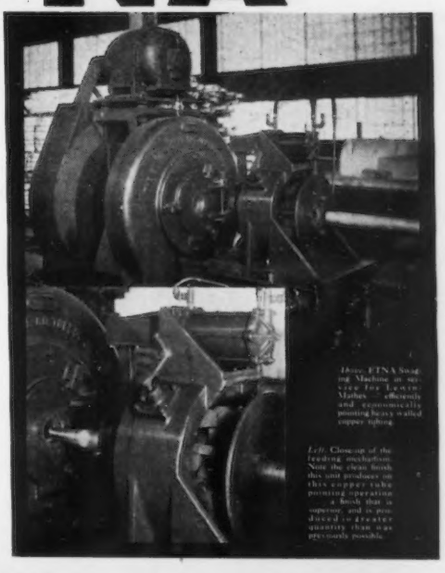

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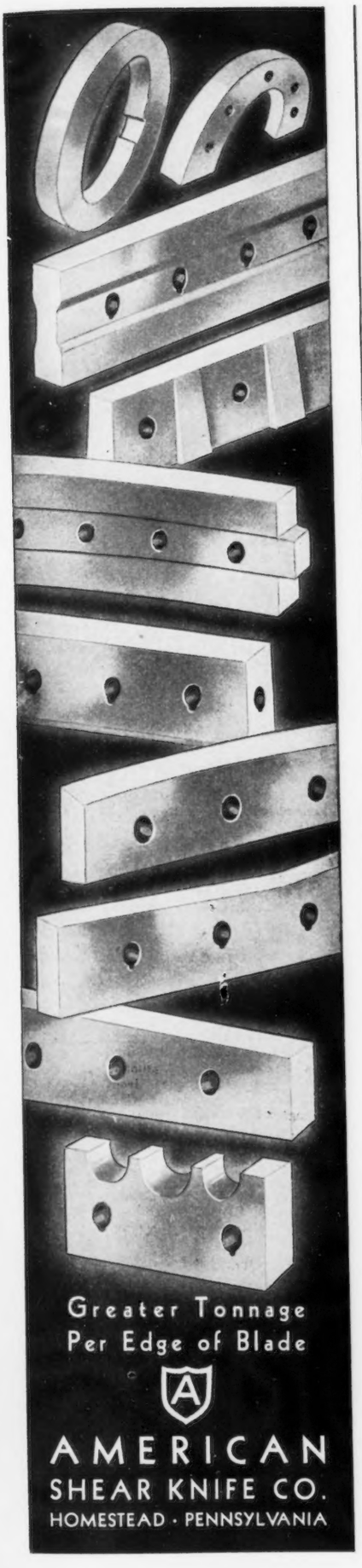
does not have time to migrate and mass along prior austenitic grain boundaries. This means heating and quenching processes should be worked out in practice to insure a quenched structure to be free from any trace of boundary ferrite. Mr. McQuaid pointed out that any attempt to obtain the maximum combination of properties in heat treated, that is quenched and drawn, steel must be based upon a fully hardened quenched structure and, therefore, the analysis, hardenability and equipment must be adjusted to produce this type of structure.

Where there is a combination of martensitic grains, or tempered martensite, with ferrite boundaries, stress concentrates in these boundaries when subjected to tension. Although relatively ductile, ferrite is not strong, and introduces a stress concentration which reduces overall ductility of the piece being tested. If, however, the structure is homogeneous, the stress will be distributed throughout the length of the test piece and the reduction of area will be maximum. Under conditions outlined in this paper, the combination of martensite and ferrite is undesirable, whether formed from slow cooling or insufficient heating, since it reduces materially the ductility of the piece.

Quenched structures, in the future, may be regarded as more important than chemical compositions, Mr. McQuaid said, thus increasing the importance of hardenability tests. Much of his discussion is applicable to case carburizing lower carbon steels where ductility of the case is important. He stated that strength of the case can be easily obtained by increasing the carbon content, and that maximum case properties are best obtained from fine grained steel, carburized to a carbon content as close as possible to eutectoid composition and quenched to produce a minimum of retained austenite.

Boeing Aircraft to Start Bomber Production in Kansas

• • • **The War Department** has announced the acceptance of a letter of intent by the Boeing Aircraft Co., Seattle, Wash., to start immediate production on heavy bombers at its Wichita, Kans., plant. The company is guaranteed reimbursement of $10,000,000 for the cost of plant and materials.



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Navy Dept., Bureau of Supplies and Accounts:

Aluminum Cooking Utensil Co., New Kensington, Pa.; containers, powder	$860,664
American Bearing Corp., Indianapolis; bearings, satco for emergency spares	162,976
American Smelting & Refining Co., Federated Metals Div., New York; bronze, manganese	110,493
American Zinc Sales Co., New York City; oxide, zinc	20,351
Amthor Testing Instrument Co. Inc., Brooklyn; outfits, gage testing	16,652
Armstrong Brothers Tool Co., Chicago; wrenches, box and socket	23,787
Atlas Steels, Ltd., Welland, Ont., Canada; stainless steel ingots	900,000
Baldt Anchor Chain & Forge Co., Chester, Pa.; chain, anchor	12,108
Batteryless Telephone Equipment Co., Inc., Pittsburgh; cables, combination life line and telephone	35,745
Bendix Products Div. Bendix Aviation Corp., South Bend, Ind.; parts for hydraulic gun charger	$79,100
Bethlehem Steel Co., Bethlehem, Pa.; armor	1,658,208
projectiles	2,725,487
ordnance equipment	1,446,000
nuts, regular, steel	111,365
Billings & Spencer Co., Hartford; wrenches, pocket and screw	24,743
Bostitch, Inc., East Greenwich, R. I.; machines, paper-fastening	35,100
Bridgeport Brass Co., Bridgeport, Conn.; ordnance equipment	3,965,730
Calumet & Hecla Consolidated Copper Co., New York; copper, ingot	60,250
Carey Machinery & Supply Co. of Baltimore City, Baltimore; planers, single surfacer; hard planers & jointers; knife grinder & jointer attachments	7,271
Caswell Strauss & Co., Inc., New York; tin, pig, grade A	291,536
Chase Brass & Copper Co., Inc., Waterbury, Conn.; brass, naval, rolled bar and angles, plain brass	174,887
Cincinnati Milling Machines & Cincinnati Grinders, Inc., Cincinnati; tools for Cincinnati milling machines	10,162
Crane Co., Washington; disks, valve	16,377
Detecto Scales, Inc., Brooklyn; scales, counter	5,621
Dempster Brothers, Inc., Knoxville, Tenn.; buckets, drop bottom garbage type	9,300
DeVry Corp., Chicago; equipments, sound motion picture, portable	125,892
Fairbanks Morse & Co., Chicago; scales, weighing beam, butchers and portable	9,713
General Electric Co., Schenectady; generators, motor and spare parts	11,342
Hartzell Propeller Co., Div. of Hartzell Industries, Inc., Piqua, Ohio; blades, propeller, aircraft, aluminum alloy	5,004
Insinger Machine Co., Philadelphia; machines, dishwashing	74,121
International Harvester Co., Washington; trucks, motor	7,700
Keystone Mfg. Co., Buffalo; wrenches "S," adjustable	5,567
Koppers Co., American Hammered Piston Ring Div., Baltimore; piston rings	5,780
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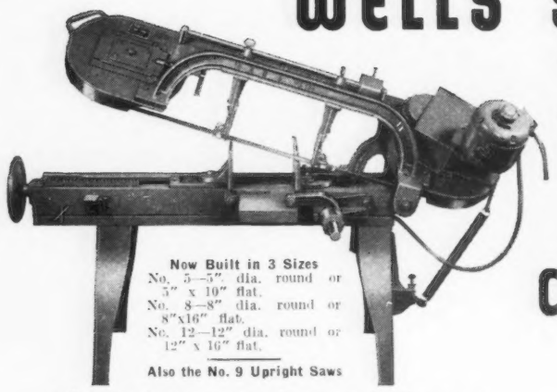

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Northern Pump Co., Minneapolis; ordnance equipment 43,605,000
Ohio Piston Co., Cleveland; pistons, assembled, complete 11,182
Osborne Construction Co., Inc., New York; stiff-leg derrick with operating hoist 8,445
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Pittsburgh Lectromelt Furnace Corp., Pittsburgh; furnace, electric arc 15,245
Pittsburgh Steel Co., Pittsburgh; tubes, boiler, seamless steel 38,460
Republic Steel Corp., Bolt & Nut Div., Cleveland; nuts, regular, steel 41,967
Revere Copper & Brass, Inc., Baltimore Division, Baltimore; brass, naval & commercial; and angles, plain brass 762,960
brass, naval, rolled, bar round, finished 43,847
Shepherd Chemical Co., Cincinnati; linoleate, manganese 9,437
Shepard Niles Crane & Hoist Corp., Philadelphia; cranes, traveling, underhung gear, hand operated with geared trolleys... 30,052
Steuart Motor Co., Washington; trucks, motor 5,396
Trimont Mfg. Co., Roxbury, Mass.; wrenches, pipe and adjustable 43,612
United Aircraft Corp., Hamilton Standard Propeller Div., East Hartford; indicator, pitch change, actuating mechanism and drawing 5,000
U. S. Rubber Co., New York; gaskets, molded rubber 5,241
Walworth Co., New York; wrenches, pipe, adjustable 18,590
C. H. Wheeler Mfg. Co., Philadelphia; condenser and auxiliaries 22,975
J. H. Williams & Co., New York; wrenches, engineers', pipe, setscrew, socket and structural.... 39,065
Woodhouse Chain Works, Trenton, N. J.; chains & fittings 13,818
Worthington Pump & Machinery Corp., Harrison, N. J.; pumps, motor driven and turbine driven 57,366
United States Steel Export Co., Washington; buildings, prefabricated 119,000
Universal Washing Machinery Co., Nutley, N. J.; machines, dishwashing 13,520
Yale & Towne Mfg. Co., Philadelphia division, Philadelphia; truck, electric, crane, revolving 8,170

War Dept., Ordnance:

Aerial Machine & Tool Corp., New York; parts for rifle $6,740
Allis-Chalmers Mfg. Co., Milwaukee; parts for tractors 54,902
American Car & Foundry Co., Berwick, Pa.; parts for tanks.. 6,962
American Cutter & Engineering Co., Detroit; punches 6,840
American Hollow Boring Co., Erie, Pa.; tubes, steel, seamless 7,450
American Metal Co., Ltd., New York; solder 39,230
Bay State Tool & Machine Co., Springfield, Mass.; parts for rifle 14,568
Fred K. Blanchard, Inc., Troy, N. Y.; wheels, grinding 6,156

E. W. Bliss Co., Brooklyn; presses, vertical 9,136
Budd Wheel Co., Detroit; parts for tanks 20,584
Carboloy Co. Inc., Detroit; tools, turning 5,715
Chevrolet Motor Div., Gear & Axle Div., Detroit; ammunition 531,774
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; machines, milling 21,183
Cleveland Tractor Co., Cleveland; tractors 1,820,000
Continental Motors Corp., Muskegon, Mich.; assemblies, flywheel 6,278
Continental Steel Corp., Superior Sheet Steel Div., Canton, Ohio; sheets, plate long terne..... 60,620
Copperweld Steel Co., Warren, Ohio; steel bar 46,117
Daco, Inc., Long Island City, N. Y.; machines, lens polishing 5,085
Electric Auto-Lite Co., Toledo, Ohio; fuze 860,000
Electromaster, Inc., Detroit; assys., fin 7,930
Ever-Tite Mfg. Co., Davenport, Iowa; grousers for tanks 5,890
Ex-Cell-O Corp., Detroit; grinders 48,485
Firestone Tire & Rubber Co., Noblesville, Ind.; assemblies, track 151,481
Fosdick Machine Tool Co., Cincinnati; drills, radial 19,300
General Fireproofing Co., Youngstown, Ohio; steel shelving 5,041
General Tool & Mfg. Co., Irvington, N. J.; tools 12,075
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.; machines, drilling and milling.... 6,837,500
Halcomb Steel Co., Syracuse, N. Y.; steel, high speed tool and bits, tool 26,582
International Nickel Co. Inc., Huntington, W. Va.; cylinders & rods 47,968
Kingsbury Machine Tool Co., Keene, N. H.; machines, indexing 28,820
McKenna Metals Co., Latrobe, Pa.; lathes & turning tools 5,093
Martin-Parry Corp., York, Pa.; high speed adapters 80,610
Maxon Premix Burner Co., Muncie, Ind.; gas burners 5,457
Modern Machine Tool & Die Co., Bridgeport, Conn.; dies 16,800
Mueller Brass Co., Port Huron, Mich.; heads & firing plugs... 16,382
National Tube Co., McKeesport, Pa.; ammunition 2,450,000
Niles-Bement-Pond Co., Pratt & Whitney Div., Hartford; gages.. 6,225

THE ARSENAL GROWS: On May 23, the Pratt & Whitney division of Niles-Bement-Pond Co. dedicated its new 48,000-sq. ft. gage building at Hartford, Conn. Clayton R. Burt (above), Pratt & Whitney president, told employees, high army officers and other guests, including many wellknown Connecticut manufacturers, of his company's efforts to aid defense.

IN EXPORT

North and South . . . East and West . . . the name—UNITED STATES STEEL EXPORT COMPANY represents four decades of overseas selling experience, expert service, and the widest available range of quality steel products.

UNITED STATES STEEL EXPORT COMPANY

30 CHURCH ST., NEW YORK, U. S. A.

Photo by Wide World

NO STONES, NO TEAR GAS: Guards and workers choose up sides for a ball game on the site of the unfinished $35 million government ammunition loading plant at Ravenna, Ohio, where a walkout of 7000 workers has ended. Work was resumed May 26.

Parent Metal Products Co., Philadelphia; benches, cabinets & parts 9,653
Poor & Co., Canton Forge & Axle Works Div., Canton, Ohio; forgings, steel, drop 5,161
Prescott Co., Menominee, Mich.; lathes 682,500
Producto Machine Co., Bridgeport, Conn.; machines, milling 6,725
Robertshaw Thermostat Co., Youngwood, Pa.; booster parts.. 278,908
Saginaw Stamping & Tool Co., Saginaw, Mich.; parts for trailers 27,722
Springfield Stamp & Die Co., Springfield, Mass.; stamps, steel 6,062
Timken-Detroit Axle Co., Wisconsin Axle Div., Oshkosh, Wis.; parts for tanks 9,898
Tredgar Co., Richmond, Va.; shells 175,536
Triumph Explosives, Inc., Elkton, Md.; assys., detonator 425,000
Union Twist Drill Co., Athol, Mass.; drills 8,678
Universal Metal Products Co., Inc., New York; tools 89,160
Victor Flush Valve Co., Newark; tubes 10,010
Vinco Corp., Detroit; gages 7,902
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; presses, loading machines, and weighing and gaging machines.. 32,345

War Dept., Other Agencies:

Aluminum Cooking Utensil Co., New Kensington, Pa.; 50,000 pots, stock aluminum 5000 filters, coffee, with fitting rings $380,438
Aluminum Products Co., La Grange, Ill.; 50,000 pitchers, water, aluminum 61,373
American Concrete & Steel Pipe Co., South Gate, Cal.; reinforced concrete pipe 50,818
William J. Beer Co., Inc., New York; clasps and blanking and swedging dies 24,330
Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; pump assemblies 108,141
Bethlehem Steel Co., Seattle; reinforcing steel 5,750
Charles Bruning Co. Inc., Chicago; printing equipment 5,583
California Corrugated Culvert Co., Los Angeles; pipe & fittings... 7,863
Caterpillar Tractor Co., Peoria, Ill.; tractors, with bulldozers... 25,251
James B. Clow & Sons, Chicago; cast iron water pipe 9,480
Consolidated Supply Co., Portland, Ore.; pipe, soil, cast iron 11,200
Crescent Mfg. Co., Fremont, Ohio; operating knife handles 5,412
Crown Can Co., Div. of Crown Cork & Seal Co., Inc., Philadelphia; container assemblies 129,750
Eugene Dietzgen Co. Inc., Washington; tripods, planetable 5,337
Ditto, Inc., Chicago; machines, duplicating 42,259
Edlund Co., Burlington, Vt.; 20,000 can openers, mechanical... 61,600
Electrical Mfg. Co., Battle Creek, Mich.; anchors & anchor rods.. 5,345
Enterprise Mfg. Co. of Pa., Philadelphia; 14,886 machines, chopper, meat and food 60,980
Equitable Equipment Co., New Orleans; steel tug 39,250
Fairchild Engine and Airplane Corp., Ranger Aircraft Engine Div., Farmingdale, N. Y.; engines and spare parts 954,667
Chas. Fischer Spring Co., Brooklyn; springs 12,720
Henry I. Flinn, Montgomery, Ala.; construction of hangar and boiler house 95,388
Fruehauf Trailer Co., Detroit; dollies 34,124
General American Transportation Corp., East Chicago, Ind.; cars, box 12,803
General Electric Co., Erie, Pa.; locomotives 23,650
Gray & Dudley Co., Nashville, Tenn.; 10,128 griddles, cast iron 43,545
Graybar Electric Co. Inc., Point Breeze, Md.; cable 218,024
Gussack Machined Products Co. Inc., Long Island City, N. Y.; couplings 11,541
Haffner-Thrall Car Co., Chicago; cars, railroad, flat 9,808
Hard Mfg. Co., Buffalo; steel desks 16,368
C. Kirk Hillman, Seattle; churn drills 20,213
Hudson Motor Car Co., Detroit; airframe parts (educational order) 821,718
Hughes Range Co., Tacoma, Wash.; two-oven type, oil fired ranges.. 5,298
Jack & Heintz, Inc., Cleveland; facilities for mfr. of aircraft starters 1,293,121
Edward Katzinger Co., Chicago; bake pans 6,490
Kearney & Traeker Corp., West Allis, Wis.; milling machines.. 7,435
Kinner Motors, Inc., Glendale, Cal.; aircraft engines & spare parts 968,277
E. A. Kinsey Co., Cincinnati; lathes 35,377
Lindberg Engineering Co., Chicago; box-type electric heat treating furnaces 24,990
Link Belt Speeder Corp., Cedar Rapids, Iowa; spare parts for shovels 22,224
Lockheed Aircraft Corp., Burbank, Cal.; airplanes & spare parts.. 444,649
Louisiana & Arkansas Railway Co., Alexandria, La.; rails, relay 30,000
Nash-Kelvinator Corp., Detroit; facilities for mfr. of propeller assys. and spare parts 8,433,860
National Cast Iron Pipe Div. James B. Clow & Sons, Tarrant, Ala.; pipe & fittings 12,532
National Supply Co., Philadelphia; diesel equipment for boats 58,104
Oneida, Ltd., Oneida, N. Y.; table knives 11,820
Pacific States Cast Iron Pipe Co., Ironton, Utah; iron & pipe.... 16,123
Parker Metal Decorating Co., Inc., Baltimore; tinplate 8,990
Walter Peter, d.b.a. Bien & Peter, Belleville, Ill.; sewer pipe..... 10,212
Pump Engineering Service Corp., Cleveland; pump assemblies .. 523,693
Ransome Concrete Machinery Co., Dunellen, N. J.; concrete mixers 24,675
Ritter Dental Mfg. Co., Inc., Rochester, N. Y.; dental operating equipment 305,069
George T. Ronk, Doing Business as Transport Trailers, Cedar Rapids, Iowa; trailers, platform type 28,019
Ruble Electric Supply, Inc., New Kensington, Pa.; steel conduit.. 11,576
James E. Sayles, Seattle; tugboat 35,240
Seattle Plumbing Supply Co., Seattle; pipe fittings 10,695
Silent Hoist Winch & Crane Co., Brooklyn; cranes, mobile 5,585
Smith Welding Equipment Corp., Minneapolis; welding & cutting outfits 5,427
Soule Steel Co., San Francisco; fabricated steel windows 12,209
Sperry Gyroscope Co., Brooklyn; controls, mount assemblies, valves, oil pressure regulators and oil filters 598,183
Standard Gas Equipment Corp., New York; gas ranges, ovens and deep fat fryers 5,128
Star Drilling Machine Co., Akron, Ohio; machines, well drilling.. 26,333
Sullivan Machinery Co., Michigan City, Ind.; parts for air compressors 5,353
Sutton Line, Inc., New York; utility boat 15,000
Thew Shovel Co., Lorain, Ohio; truck cranes 38,710
Truscon Steel Co., Youngstown, Ohio; prefabricated steel buildings 21,059
Underwood, Elliott Fisher Co., Bridgeport, Conn.; accounting machine parts 11,400
United Aircraft Corp., Hamilton Standard Propeller Div., East Hartford; maintenance parts... 52,441
United Car Fastener Corp., Cambridge; buttons and washers, brass 8,143
Vickers Inc., Detroit; pump assemblies 322,344
Wallace & Tiernan Co. Inc., Belleville, N. J.; water purification units 119,400
Williams, White & Co., Moline, Ill.; hydraulic presses 25,400
Wright Aeronautical Corp., Paterson, N. J.; aircraft engines & spare parts 4,365,698

OPM Finds Aluminum Needs Still Outrun Supply

• • • **The OPM Priorities** division last week warned of more serious curtailments of civilian and non-defense uses of aluminum, urged manufacturers to make broad "jumps" in turning to substitutes, and estimated that defense needs during June will take from 95 to 100 per cent of all aluminum, including scrap.

Despite the 182,000,000-lb. expansion of aluminum facilities since 1940, increased production this year has not kept pace with the increased military demand. An OPM tabulation shows these proportions of aluminum going for defense needs: For March, 79 per cent; April, 83 per cent; May, 94 per cent; June, nearly 100 per cent. These figures cover the production of virgin or primary metal only.

In recommending broad "jumps" in finding aluminum substitutes, the priorities division urged that manufacturers survey the potentialities of materials other than those now included under mandatory, industry-wide priority control. These include, in addition to aluminum, magnesium, nickel, nickel-steel and ferro-tungsten. Zinc is subject to partial control while 16 other metals have been brought under a mild form of priority regulation, an inventory control plan designed to curb excessive inventories.

Two New Books Issued On Blueprint Reading

• • • **Problems of defense** training have brought out a number of texts for beginners in shop practice. Two short books, each selling for $1, have appeared recently on blueprint reading. One was written by George Boland, chief tool engineer, Eureka Vacuum Cleaner Co., Detroit, and has been printed by Edwards Brothers, Inc., Ann Arbor, Mich. The other was prepared by John J. Weir, instructor in mechanical drawing, Dickinson High School, Jersey City, and has been published by McGraw-Hill Book Co., Inc., New York. Both books are of looseleaf form with circular wire binding.

"ANY RAGS, ANY ALUMINUM": With the encouragement of the OPM, businessmen and school children at Madison, Wis., and Richmond, Va., conducted a test campaign to salvage scrap aluminum. This photograph shows some of the pots and pans collected at Richmond. A similar nationwide collection is being considered.

Photo by Wide World

40,000th Army Truck Delivered By Dodge

Detroit

• • • **Delivery to the War Department of the 40,000th Army truck produced within the past 12 months by the Dodge Division of Chrysler Corp. has been made. This is the largest number of trucks produced by any individual company for the United States Army during that period. At present more than 250 military trucks are being produced each day at the Dodge Truck Plant, Detroit.**

Record Scrap Consumption Runs 50% Ahead of 1940

• • • **Steel mills, blast furnaces,** and foundries in the first four months of 1941 consumed 17,518,000 gross tons of iron and steel scrap, a record breaking tonnage, compared with 11,669,000 tons melted in the similar period of 1940, the Institute of Scrap Iron and Steel, Inc., estimates.

This increase of 50 per cent in the use of scrap compares with a rise of 49 per cent in the production of steel ingots and 30 per cent in pig iron, in the manufacture of which scrap is principally used. Notwithstanding the unprecedented requirements scrap has been available, the institute points out.

Domestic consumption in April is placed by the institute at 4,406,000 gross tons, a reduction of 256,000 tons from March, due to the shorter month and the slowdown of blast furnaces caused by the bituminous coal strike. In April, 1940, the melt was only 2,548,000 tons.

Wisconsin Foundrymen Elect A. C. Ziebell President

Milwaukee

• • • **A. C. Ziebell,** Oshkosh, Wis., was installed as president of the Wisconsin chapter, American Foundrymen's Association, at its dinner meeting at the Schroeder hotel. Other new officers are: vice-president, Howard Waldron, Milwaukee; secretary, George Dreher, Milwaukee, and treasurer, R. F. Jordan, Milwaukee. B. D. Claffey, retiring president, was presented with a ring by the chapter.

New OPM Steel Order Is Short Step From Mandatory Priorities

Washington

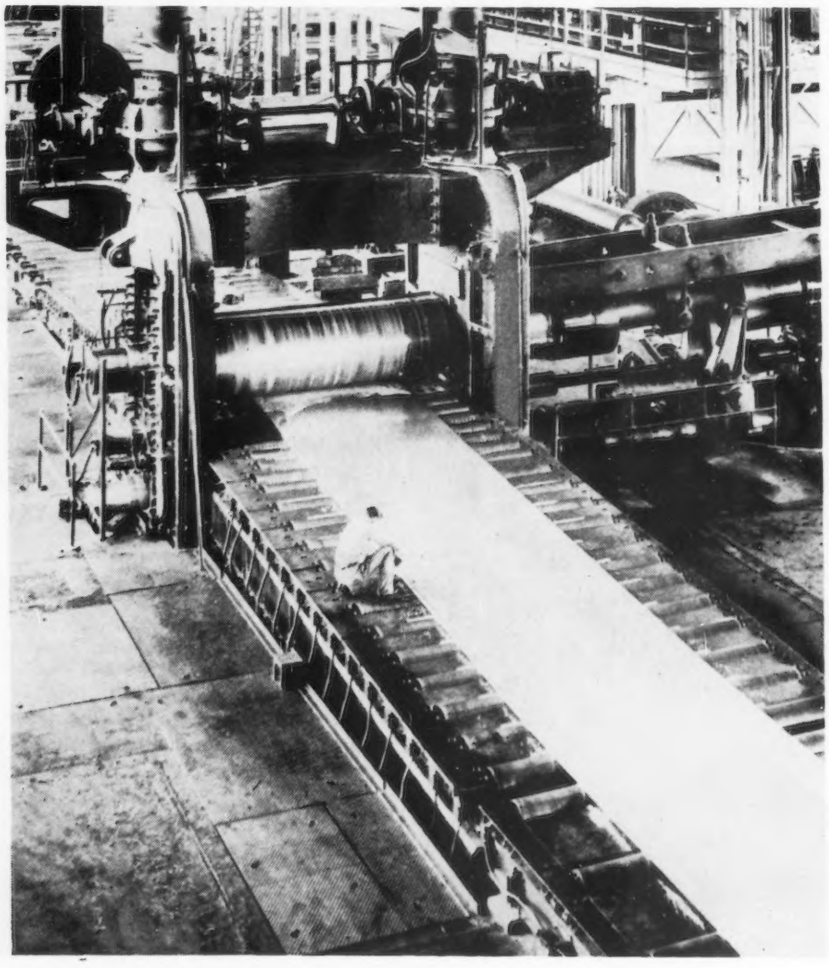
• • • **With the explanation** that the overall demand is "greater than the apparent capacity to make deliveries of certain types of steel and steel products promptly," Director of Priorities Edward R. Stettinius, Jr., last week issued a general steel preference delivery order under which a steel supplier, upon complaint, will be required to make a sworn statement explaining why a particular order was rejected or deferred.

The OPM called it essential that orders for defense operations and important non-defense projects are neither rejected by steel suppliers nor unreasonably deferred in delivery. It gave this account of how the plan is expected to function:

"Any customer who by his own efforts has been unable to obtain satisfactory placing, or delivery of his orders for steel, can make a sworn statement of his difficulties to the Priorities Division of the Office of Production Management.

"The Priorities Division, if the case seems justified, will then require the supplier involved to make a sworn statement explaining why the order was rejected or deferred. Upon the basis of this information, the division will take whatever priority action is necessary to fill defense and essential non-defense needs for steel promptly."

ALUMINUM ROLLING: This photograph showing the rolling of aluminum was taken at the Aluminum Co. of America's Alcoa, Tenn. plant.



The new action, which represents a step short of invoking mandatory priorities, also has been adopted by OPACS as the basis for a program for the equitable allocation of steel among competing civilian needs after military defense requirements have been met.

The Stettinius order did not specify the types of steel to be affected but its mention of "certain types," on which the demand was said to be greater than the apparent capacity to make deliveries, was taken as pointing to immediate application to plates, shapes, bars and semi-finished steel. However, the apparent flexibility and informality of the announced plan will permit its extension beyond these specific products since the action was described as one designed to give defense needs and essential civilian needs first call on "all forms of steel."

Promulgation of the general steel preference delivery order subjects iron and steel products generally to a third method of priority control. Iron and steel products previously had been placed on the critical list which covers items subject to the preferential classification system. More recently a mild form of priority regulation, identified as the inventory control plan, was invoked in the case of 16 metals and classifications of metals.

Copies of the OPM order were directed to all producers of pig iron, ferro-alloys, steel ingots and castings, and all carbon and alloy steel products, and to their customers. Such producers were advised to fulfill present and future defense orders, giving preference to the extent necessary to assure deliveries as provided by existing delivery schedules. All of these schedules, however, would be subject to any subsequent instructions issued by the Priorities Division after any complaints were filed by a customer.

Copies of complaint forms to be used by customers were distributed by the OPM as were also order forms to be issued to producers by the Priorities Division. Under the system, if the OPM finds that a customer's complaint justified the issuance of an order, the producer is given five days in

which to submit a sworn statement setting forth in detail the cause for deferment of delivery or rejection of any order. The Priorities Division will then take such steps as it regards as appropriate.

Any producer against whom an order had been issued would be subject to inspection of all records in connection with deliveries or orders covered by a complaint.

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Full Text of OPM's Steel Delivery Order

• • • **Full text of the** General Steel Preference Delivery Order issued by E. R. Stettinius, Jr., OPM Director of Priorities, (effective May 29, 1941), follows:

To all producers of pig iron, ferro-alloys, steel ingots and castings, and all carbon and alloy steel products, and to their customers:

Whereas, it is found that the current demand for deliveries of these products under Defense Orders, as hereinafter defined, and for civilian purposes, is greater than the ability of producers to deliver the same in the required amounts upon delivery dates scheduled; and

Whereas, deliveries of these products are being delayed and orders therefore rejected due to the aforesaid causes; and

Whereas, it is necessary to assure deliveries under Defense Orders and other orders for necessary non-defense purposes when scheduled and to assure that such orders be not rejected; and

Whereas, the purposes of this order may be fulfilled by authority conferred by the several Acts of Congress, Executive Orders and regulations hereinafter cited:

Now, therefore, it is hereby ordered:

936.1. General Steel Preference Delivery Order:

(a) For the purposes of this order:

(1) "Defense orders" mean all contracts or orders for delivery of pig iron, ferro-alloys, steel ingots and castings, and all carbon and alloy steel products which are to enter directly or indirectly into the manufacture of any material

(i) for the Army or the Navy of the United States, or

(ii) for the defense of Great Britain, or

(iii) for the government of any other country whose defense the President shall have deemed to be vital to the defense of the United States under "An Act to Promote the defense of the United States" (Public No. 11, 77th Congress, First Session, approved March 11, 1941), or

(iv) for the account of the following agencies of the United States Government: The Coast Guard, Maritime Commission, Coast and Geodetic Survey, Panama Canal, National Advisory Committee on Aeronautics, and the Civil Aeronautics Administration.

(b) All producers of pig iron, ferro-alloys, steel ingots and castings, and all carbon and alloy steel products shall fulfill present and future Defense Orders, giving preference to the same, whenever and to the extent necessary to assure deliveries under such orders in accordance with the delivery schedules provided therein.

(c) Deliveries of the aforesaid products by any producer thereof shall hereafter be made in accordance with any written order, supplementary order, or instruction which may hereafter be issued, if and when the same are hereafter issued.

(d) Any customer of a producer of the aforesaid products whose deliveries thereof under any order have been unreasonably deferred by a producer, and any prospective customer of a producer of the aforesaid products whose order therefor has been rejected by such producer may file with the Division of Priorities, Office of Production Management, Washington, D. C., Report Form PD-32 (Exhibit A attached hereto) duly executed and sworn to by him in the manner herein provided, setting forth the facts called for in said Report Form PD-32 in connection with such deferral or rejection.

Upon receipt of such Report Form PD-32, duly executed and sworn, from a customer, Order Form PD-32a (Exhibit B attached hereto) will be issued to the producer or producers indicated by such customer if the facts set forth by such customer justify such issuance, and thereupon within five days of the issuance of such Order Form PD-32a, the producer or producers to whom the same has been issued shall submit a sworn statement to the Division of Priorities, setting forth in detail the cause or causes for the deferral of the delivery or deliveries, or the rejection of the order or orders specified.

Thereafter, such action will be taken and such Order or Orders issued as may be fitting and appropriate under the circumstances discolsed by the customer and the producer or producers in question.

Any producer or producers of the aforesaid products to whom an Order Form PD-32a is issued, shall submit to inspection of any and all records, documents and data in connection with the delivery or deliveries, order or orders referred to in said Order Form PD-32a by a representative of the Division of Priorities.

(e) The General Preference Order No. M-5 (Part 926) for the conservation and distribution of nickel-bearing steel, the General Preference Order No. M-3 (Part 923) to direct the distribution of ferro-tungsten, tungsten powder and tungsten compound, and the General Metals Order No. 1 (Part 928) to restrict inventory accumulation of certain specified materials, issued by the Director of Priorities, are not affected by the terms and provisions of this Order.

(f) This Order shall take effect

Bethlehem Reaches New Output Peak

• • • Bethlehem Steel Co. set a new all time production record in May, 1941, with an estimated total output of 1,040,000 tons. The prior high mark of 1,024,026 tons was in March, 1941.

The total average operations for all plants were 103 per cent of rated capacity. Performance during May includes new high output records for the plants at Bethlehem, Pa., Lackawanna, N. Y., and Johnstown, Pa., with the other plants close to their record mark. Shipments of finished iron and steel products from the plants also reached an all-time high, including electric furnace steels, plates and structural material.

on the 29th day of May, 1941, and unless sooner terminated shall expire on the 31st day of December, 1941.

OPM Acts to Increase Shipyard Crane Output

Washington

• • • **Superseding the** March 13 order which assigned a limited blanket priority rating to nine crane builders, the OPM priorities division last week gave 27 crane manufacturers the right to use a preference rating of A-1-a in an effort to speed crane production for shipyard work. The previous rating granted was A-1-c.

Like the former order, the new instructions specify the following materials on which the rating may be used:

Finished or semi-finished fabricated bars and accessories; bar, plate, shapes, forgings, and castings of steel; electric motors, switches, controllers and connections.

Athough 27 crane builders were designated, officials said that other manufacturers may apply for the rating but only if they need assistance for the completion of cranes needed for defense. A producer must agree in writing to its use, after which he may apply the rating to contracts or orders placed with suppliers by means of photostatic copy. The new rating does not extend to sub-contractors, it was explained. They are required to make application for priority aid in the usual way.

Revere Copper Makes Awards For Ideas from U. S. Workers

• • • **Nine typical** American workmen were notified last week they were winners in the $10,000 award offered by Revere Copper & Brass, Inc., for best contributions made by workers to America's defense plans, military and industrial.

Leading the list and winner of the first prize of $5,000 was Eugene Phillips, Fort Worth, Tex. Second award of $2,500 went to William R. Holcomb, Burbank, Cal. Third prize of $1,000 was awarded to Oscar B. Leibst, Seattle, for a structural design eliminating use of rivets and clips.

Defense Comes First, 16,000 Manufacturers Promise W. S. Knudsen

Chicago

• • • **Illinois industrialists,** most of whom are engaged in military production, last week heard William S. Knudsen, director general of the Office of Production Management, Leon Henderson, Price Administrator, and Philip D. Reed, senior consultant of the priorities division of OPM, speak on the government's viewpoint, problems and policies for defense, at the 6th annual international convention of the National Association of Purchasing Agents, and the Chicago Conference on Preparedness, sponsored by the Illinois Manufacturers' Association and the National Association of Manufacturers.

At the manufacturers' conference, Mr. Knudsen was presented with a special book containing the signatures of 16,000 manufacturers, from coast to coast, pledging cooperation and the determination to put "patriotism above personal gain."

Mr. Henderson, warning of "types of adjustment which no industrialist has experienced in history," told the purchasing agents, "I mean that most of you face not only drastic reductions in raw materials, but also in your highly skilled labor if that labor is needed more in some other places. For years you've had freight agents fighting for your favors. Now you'll be going down to the yards and hunting for cars. You'll have the government tell you to simplify your products. You'll have the OPM pressing you to take orders on which there will be little or no profit. And this is only the beginning."

Mr. Knudsen, at the manufacturers' conference, said that the job of defense would be done in a way that "will provide initiative and free enterprise. This is a struggle between centralized and decentralized plans," Mr. Knudsen said. "We all know where America stands. This country was built on a decentralized plan." Mr. Knudsen emphasized the need for speed and called rearmament the manufacturers' job.

"I anticipate a national labor organization led by able and understanding men," Mr. Reed told the Purchasing Agents, "who will negotiate all questions pertaining to wages, hours and conditions of work, with business leaders acting in concert through associations of employers on an industry basis." He also predicted a continuing trend toward centralized control of money and credit.

David R. Clarke, general counsel of the Illinois Manufacturers, said that establishment of a government controlled "labor front," such as that predicted by Mr. Reed, would mean the end of the present enterprise system.

Walter D. Fuller, president of the National Association of Manufacturers and of the Curtis Publishing Co., urged that the Administration appoint "an industrial chief of staff to clear the confusion of administrative duplication," and recommended Mr. Knudsen for the job.

Other speakers at the two meetings were Robert M. Gaylord, president of the Illinois Manufacturers' Association and the Ingersoll Milling Machine Co., General Robert E. Wood, vice-president, National Manufacturers' Association, John C. Gall, counsel, National Association of Manufacturers, who addressed the preparedness conference; and G. E. Price, Jr., Goodyear Tire & Rubber Co., Akron, Ohio, president of the Purchasing Agents' association, George W. Aljian, California & Hawaiian Sugar Refining Corp., Ltd., W. W. MacMillen, National Malleable & Steel Castings Co., Cleveland, Edward L. Ryerson, Jr., Inland Steel Co., Seymour Wheeler, Interlake Iron Corp., George S. Brady, chief, substitute and secondary materials section, Office of Price Administration, W. E. Bittner, Diamond Alkali Co., Frederick J. Heaslip, Fairbanks, Morse & Co. Chicago, and Julian G. Davies, N. Slater Co., Ltd., who addressed the purchasing agents.

New Copper Plating Process

• • • **A new** bright copper plating process which may be of interest to many concerns attempting to conserve nickel is announced by Dr. Louis Weisberg, 71 West Forty-fifth Street, New York.

U. S. Planes Improve Rapidly, Jouett Tells Aviation Convention

Louisville, Ky.

• • • **Coming developments** in airplane design, possibilities of long-range bombers, and factors affecting production of planes in the United States were topics discussed in an address by Col. John H. Jouett, president of the Aeronautical Chamber of Commerce of America, Inc., before the National Aeronautic Association, in its annual convention here on June 2.

Mechanical and design developments in American aviation now being worked out in the industry, Col. Jouett said, will have considerable influence on the performance of aircraft produced before the end of the war. Some of the developments that the industry is now working on are:

1—The laminar flow wing is being developed to increase the efficiency of wing design. More attention is being paid to surface finish. Spot welding and flush riveting are being used on an extensive scale.

2—High lift devices are being developed to offset the effects of high wing loading on landing and take-off characteristics. Wing loadings of over 30 lb. per sq. ft., are common now, and it is anticipated that this figure will be materially increased in the near future.

3—More or less fundamental principles of fluid mechanics have only recently been applied to air-cooled engine installations, with the result that the cooling drag has been reduced to a value that compares favorably with the radiator drag of liquid cooled engines. These same principles have been applied to the design of radiator, intercooler, and oil cooler ducts with marked improvements.

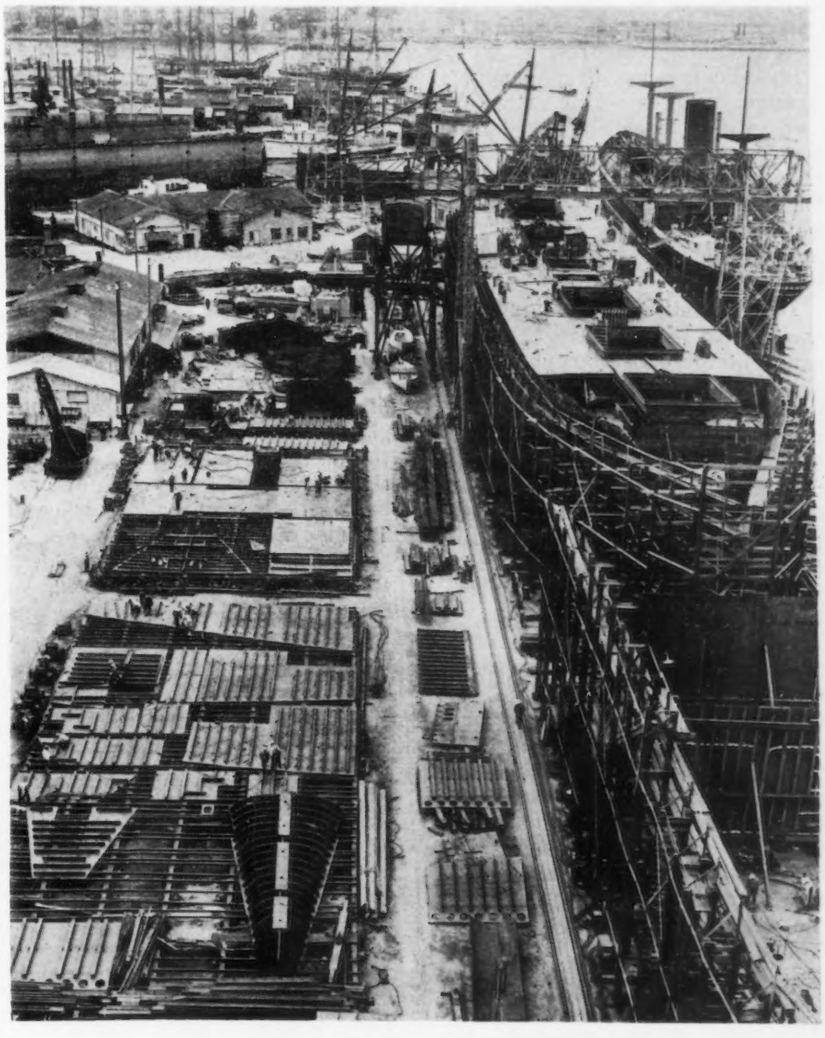
4—The possibility of using engine exhaust to obtain thrust through the use of properly designed jets to obtain a form of propulsion is becoming more attractive in high performance planes.

5—Engine power continues to increase as refinements are made in combustion chamber design, cooling, carburetion and aircraft fuels. These improvements have been made with no sacrifice in reliability or economy of operation. We now have in mass production two aircooled radial engines capable of developing more than 2000 hp.

In order to maintain engine horsepower in the rarefied atmosphere of high altitudes, it is necessary to provide methods of supercharging the carburetor manifold, Col. Jowett said. Two types of supercharger are now used, and improvements are being made constantly.

Propeller manufacturers have developed propellers capable of absorbing the increased engine horsepower. This problem was fairly simple in large airplanes where a large diameter unit could be used, but in small pursuit planes the conversion of 2000 hp. to thrust has been difficult, and has resulted in innovations in propeller design. To eliminate torque, counter-rotating propellers are being developed which still retain their full feathering characteristics. Cuffs have been added to help streamline the propeller blade shank, and in the case of air-cooled engines, have facilitated ground cooling. Four-blade propellers have been developed to reduce the diameter in order to maintain sufficient ground clearance in the case of planes with

SHIP AND A HALF: Mass production assembly line technique is applied to shipbuilding at the Consolidated Steel Corp.'s yard at Long Beach, Cal. At the right is the half hull of a ship under construction. Above it is a complete hull nearly ready for launching. When the complete hull is launched, the half hull will be finished and another half started. *Photo by International*



nose wheel landing gears. Reversible propellers which assist large seaplanes to maneuver on water have been used successfully.

Other significant improvements have taken place in the development of new blade alloys, new means of propeller de-icing and new methods of studying and eliminating propeller unbalance and vibration. Propellers, like superchargers, must operate efficiently at altitude, and to accomplish this, two-speed gears are being worked out so that a different gear ratio may be employed for take-off and at altitude.

A great deal of technical progress has been made in the selection of design details suitable for production. This problem has heretofore received little attention because of the absence of production schedules. More recently, however, production characteristics of a design have been rated as almost as important as aerodynamic features. Large hydraulic presses, drop hammers, electric spot welding machines and other forms of production tooling are now quite common throughout the industry, and moving conveyor systems and endless belt assembly lines are being installed in several plants, the speaker said.

Col. Jouett pointed out that strikes by labor, more than any other factor, can disrupt the aircraft production program so seriously as to render our effective aid in this war too little and too late. Plane production, originally planned for 15,000 planes for our own air force, was raised to 37,000 planes, then to 44,000 planes, and is about to be jumped again to 80,000 planes for American and British forces, he noted.

The demand for long-range bombers by the thousands reflects the changing directives of the war, Col. Jouett states. The long-range bomber is a weapon of offense, to be used to reach a distant enemy wherever he may be, and can be used to help solve the convoy problem on the seas. These bombers can carry enough heavy bombs to sink surface or sub-surface ships, and can be sent out from this side of the Atlantic on regular schedules to patrol the convoy course all the way to England.

Photo by Wide World

AQUA-CHEETAH: Army officials are shown testing this "aqua-cheetah," a seagoing scout car capable of doing 60 mph. on land. The inventor is Roger W. Hofheims, of Buffalo.

Correlated Plants to Lift Chicago Defense Output

Chicago

• • • **Correlation of manufacturing** facilities under the "mother hen" principle is expected by the Defense Contract Service Office of the OPM here to increase armament production capacity in this area. By this principle a moderately sized company gathers around it, on a voluntary basis, 15 or 20 companies whose combined facilities make the group comparable to a major corporation. This group, acting through the first company, bids on defense contracts as a unit. The office of Thomas S. McEwan, manager of the Seventh Federal Reserve District, has surveyed thousands of firms of possible participators, and has already obtained surplus capacity in metal stamping and punching, gray iron and malleable casting, wood working and stone cutting. Mr. McEwan cited the instance of a company reporting an idle battery of screw machines. Within two hours, seven companies had been found with work for these machines. Another firm, said Mr. McEwan, within a week after asking the service for defense work, reported that it was now working overtime and would be forced to expand facilities if more contracts were obtained.

Machine Shop Training Books Available at Cost

• • • **A series of monographs** comprising suggested unit courses in various phases of machine shop practice have been prepared by the Bureau of Industrial and Technical Education, of the University of the State of New York. Designed for beginners in machine shop practice, the texts are intended for use in vocational education programs for national defense industries and were prepared in cooperation with the U. S. Office of Education.

The texts, which are in loose leaf form with spiral wire binding, cover courses in heat treatment, drill press work, bench work, blueprint work, measurement, job sheets and mathematics. All monographs are of a practical nature and concern typical shop problems. The book on mathematics, the largest of the group, comprising 190 sheets, concerns itself with arithmetic applied to the machine shop and gives an unusually practical approach to the subject.

The booklets are being made available to industry at cost. Prices range from 45c. to $1.15 for single copies, with lower unit prices where the texts are ordered in quantity. Price list may be obtained from the Greenwood Co., 26 Hamilton Street, Albany, N. Y.

Armco Starts Building New Houston Plant

Houston

• • • **George M. Verity, chairman** of the American Rolling Mill Co., broke ground on May 27 for the open hearth department of the Sheffield Steel Corp.'s new $17,000,000 plant, on the ship canal near Houston. The corporation, a subsidiary of Armco, will use a process it developed in 1918 for making steel exclusively from scrap iron, which makes possible the operation of steel producing units distant from iron mines. The three open hearth furnaces of the Texas unit will produce 200,000 tons of ingots annually. Equipment will include billet mills and, in the finishing departments, structural and tie plate, merchant bar, reinforcing and rod, wire, hot rolled sheet, and plate mills. The plant, which is built in a forest, has a mile of frontage on the ship canal and has been designed to permit expansion. It is expected to get into operation early next year, when it will employ 1500 men with an annual payroll of $2,500,000.

Speakers at the ground-breaking ceremony were Mr. Verity, W. L. Batt, deputy administrator of the Office of Production Management, and Mr. Calvin Verity, executive vice president and general manager of Armco. Mr. Batt said the OPM was interested in seeing a steel plant established in Texas, away from the highly industrialized sections, where it would continue to contribute to the economy of the area after the emergency.

Salaries Lifted for G-M Office Workers

Detroit

• • • **June 1 pay envelopes** brought salary increases to approximately 30,000 General Motors Corp. office workers. The increases amounted to $15 per month to all employees in the level below $200. There also were increases of varying percentages to a number in the salary brackets immediately above the $200 level. These increases follow a recent grant of 10c. an hour to workers receiving hourly wages in the plants of General Motors Corp.

GEORGE M. VERITY, dean of American steel manufacturers, turns first spadeful of earth for open hearth of Sheffield Steel Corporation plant on the Ship Canal near Houston, Texas.

Canada's Plate Mills Booked 2 Years Ahead

Toronto

• • • **A shipbuilding program** for Canadian shipyards, announced by the Canadian government, now involves expenditures of more than $250,000,000 for war and merchant vessels. Plate for these ships will be rolled on the only plate mills now in operation in Canada, the two mills at Hamilton, Ont., and orders have been placed that will take the entire output of these mills for the next two years.

Canadian sheet producers are booked almost solid to the end of the year, with one producer withdrawing from the market. Delivery dates on merchant bars, structural materials and reinforcing bars are also being pushed back toward the end of the year. Most of the current bookings are for war industry construction work, and while Canada's war industry is making progress with regard to production, its efforts have been somewhat hndicapped because of the difficulty in obtaining steel.

An order for 20 locomotives has been placed with Canadian Locomotive Co., Kingston, Ont., by the Canadian Pacific Railway Co. Canadian Locomotive Co. has started to machine armor plate and is producing tank parts and other war equipment. Orders on hand total about $5,000,000.

For the week ending May 16, about 2867 contracts valued at $12,705,199 have been awarded by the Department of Munitions and Supply, Ottawa, Ont., including orders to United States companies amounting to $129,589. The more important contracts awarded include:

Aircraft — Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Que., $224,562; Aviation Electric, Ltd., Montreal, $180,830; Noorduyn Aviation, Ltd., Montreal, $36,465; Irvin Chute, Ltd., Ottawa, Ont., $36,450; Fleet Aircraft, Ltd., Fort Erie, Ont., $22,800; Macdonald Bros., Aircraft, Ltd., St. James, Man., $63,121.

Ordnance—John Inglis Co., Ltd., Toronto, $1,930,500.

Munitions—Robert Mitchell Co., Ltd., Montreal, $282,421; Dominion Arsenals, Ottawa, Ont., $83,400; Wallaceburg Brass, Ltd., Wallaceburg, Ont., $54,019.

Ford of Canada Will Build $1,000,000 Foundry Addition

• • • **Ford Motor Co.**, of Canada, Ltd., 2780 Sandwich Street, Windsor, Ont., has awarded a general contract to Dinsmore McIntyre Co., Ltd., 903 Security Bldg., and a structural steel contract to Canadian Bridge Co., Ltd., Walker Rd., Walkerville, Ont., for an addition to a foundry to cost $1,000,000 and is preparing for additions to its heat treating building to cost $65,000.

Order Cars Freely, Budd Tells Railroads

Washington

• • • **Declaring that there** has been some delay in building freight cars because of inability of car builders to obtain sufficient steel, National Defense Commissioner Ralph Budd, OEM Transportation Division, has issued a statement saying that some car builders reason that if material cannot be provided there would be no point in undertaking a larger production. Mr. Budd was referring to the plan to add 120,000 cars to railroad ownership prior to the fall of 1942 and for 1943 to add further a total of 150,000 cars.

"In urging the railroads to order cars liberally, we have assured them that the importance of transportation is well recognized, and that it must be assumed the necessary materials for an adequate car program will be provided," said Mr. Budd. "Obviously, all of our defense efforts must be integrated if we are to be fully successful. There is no point in producing an increased volume of defense materials if such materials cannot be transported from where they are built to where they are needed.

"To meet the needs of the steel industry, transportation of ore on the Great Lakes has been geared to a tempo which utilizes 100 per cent of existing cargo carrying facilities. To augment the American fleet, the cooperation of Congress was sought in the passage of legislation which will enable the use of Canadian boats in our ore traffic. Congress responded favorably and quickly to this request. Ore movements on the Great Lakes for this season are 9,300,000 gross tons ahead of the corresponding period in 1940."

The traffic demand for all commodities is such, Mr. Budd said, that no use of railroad equipment for storage purposes can be permitted. It may be necessary, he pointed out, to control the wheat movement by means of an embargo and permit system, due not to lack of transportation facilities but to the storage shortage.

$28 Million Propeller Plant Planned at Toledo

• • • **A $28,000,000 aviation** development is to be established in Toledo, according to announcements which reveal that Aviation Corp. of America will establish a new division to be known as American Propeller Corp. Expenditure of $26,500,000 by the propeller company for a 500,000 sq. ft. airplane propeller plant will be the principal part of the new endeavor. In addition, a $1,500,000 aviation experimental plant will be erected.

The propeller plant will employ more than 4000 skilled workers, at least 80 per cent of them Toledoans or men trained in defense courses in Toledo schools.

The company has been allotted $8,700,000 by the government for construction of the first unit of the propeller factory. Output of the plant is expected to exceed 2500 new type, pressed seamless steel tubing propellers a month at the start, ultimately reaching 8000 blades per month.

Machinery in the experimental plant which is to be built by Aviation Corp. separately from the government built plant will represent an investment of $500,000. The plant is now a part of the Lycoming Works division of the corporation in Williamsport, Pa.

William S. Wise, former Toledo executive, who is now executive vice president of Aviation Corp., is president of the new company.

8-Million Ton Year Seen For Republic

Youngstown

• • • Citing the steel industry's vital contributions to the national defense program with ingot capacity now at an all-time high mark, G. H. McClain, superintendent of industrial relations for the Warren District of Republic Steel Corp., said here May 27 that Republic alone probably will produce 8,000,000 tons of steel this year if the present rate of operations continues.

Mr. McClain was addressing the annual banquet of the Youngstown Junior Chamber of Commerce. He asserted the steel industry expects to spend more than $282,000,000 for productive equipment.

Defense Plant Projects Approach $3 Billions

Washington

• • • **The OPM Bureau of Research** and Statistics estimates that new defense plant construction, expansion, and equipment since the defense program began a year ago involves more than 1700 construction and expansion projects and commitments of nearly $3,000,000,000. It made public this tabulation of commitments, United States Government and private, for new defense plant facilities (in thousands of dollars):

Product or Service	*Government*	*Private*	*Totals*
Iron and steel production	135,994	144,171	280,165
Ammunition, shells, bombs, etc.	282,425	38,161	320,586
Guns	184,864	22,038	206,902
Aircraft, engines, parts and accessories	490,821	95,444	586,265
Ships and ship repair	467,519	10,417	477,936
Vehicles and tanks	25,623	17,783	43,406
Non-ferrous metals and products	67,937	145,243	213,180
Machinery, except electrical	44,220	101,608	145,828
Electrical machinery and equipment	13,412	14,451	27,863
Chemicals, including explosives	303,707	53,251	356,958
Production of petroleum and coal	13,933	7,275	21,208
Miscellaneous manufacturing	27,309	14,776	42,085
Non-manufacturing	.....	79,719	79,719
Totals	2,057,764	744,337	2,802,191

(British commitments are not included in the above table.)

Electric Furnace Plant To Be Built At Portland, Ore.

Washington

• • • **Contracts for the** purchase of 13,000 kw. of Columbia River power for production of ferro-alloys have been signed by Bonneville Power Administrator Paul J. Raver and F. P. Cormely, vice-president and general manager of the Electro-Metallurgical Co.—the sixth major industry to purchase government generated electricity for national defense production.

The company, a subsidiary of the Union Carbide & Carbon Corp. of New York, will complete construction of an electric furnace works in the St. John's District, Portland, Ore., about Feb. 1, when it will begin production of alloying metals for use in the steel and non-ferrous industries and military transport industries vital to national defense. The plant also will produce calcium carbide, the raw material from which acetylene, acetone, and other defense necessities are made.

Under the terms of the agreement, the Electro-Metallurgical Co. will purchase 6500 kw. of energy for a 22-year period, and 6500 kw. for a two-year period. Under each contract deliveries will begin with blocks of 5000 kw. in February, 1942. Demand will be increased at the rate of 500 kw. per month on each contract until a total combined contract demand of 13,000 kw. is being taken. Payment to the Government will be made at the rate of $17.50 per kw. per year. The contract provides for purchases of additional power as necessary to meet continued plant expansion.

The Electro-Metallurgical Corp. some weeks ago announced the purchase of a plant site contiguous to the Power Administration's substation in the St. John's industrial district of Portland. Preliminary construction work is already under way. The firm is the fifth such enterprise to be established in the Pacific Northwest as the result of the availability of low-cost power. Among others are the Aluminum Co. of America, which last week completed the fifth unit of its plant near Vancouver, Wash., and the Reynolds Metals Co., which is now constructing an aluminum reduction plant for operation at Longview, Wash.

Phoenix Iron Reopens After Two-Week Strike

Phoenixville, Pa.

• • • **Phoenix Iron Co.** and its subsidiary Phoenix Bridge Co. resumed full operation on Monday, June 2, after being closed down by a strike on May 15. Partial operation was begun on Friday, May 30, but the full force of 1600 workers did not return until Monday. The 125-year-old company, which makes and fabricates structural shapes, is now operating four out of six open-hearths, the same number as before the strike started.

The dispute arose over the claim of the Steel Workers Organizing Committee of the CIO to represent the workers, although the NLRB had previously certified a local company union. No formal settlement was made with the CIO union. With the local newspapers and merchants supporting the company's position, and with the plea of the President Tuesday night urging labor not to engage in unnecessary strikes, a voluntary back-to-work movement developed which a strike-rally called by the CIO organizers Saturday night failed to halt.

Roosevelt Proposes Defense Highway Program

Washington

• • • **President Roosevelt** on Monday recommended to Congress a defense highway construction program calling for a $25,000,000 authorization to strengthen bridges and widen road surfaces in key areas and a $100,000,000 authorization for developing access roads.

Mr. Roosevelt turned down as too extensive a $458,000,000 road building program recommended by the Federal Works Agency, but expressed the view that there is a real need for giving prompt attention to strengthening bridges in key areas where existing structures are inadequate to accommodate rolling equipment of the Army, and that additional funds are necessary to relieve existing traffic congestion in important areas.

OPM Conducts Test Aluminum Collection

Washington

• • • **The five-day test** collection of aluminum ware just completed at Richmond, Va., and Madison, Wis., apparently has "gone over big." If this proves to be true, OPM, which instituted the experiment, will ask that the plan be extended nationally under supervision of Mayor La Guardia of New York as Director of the Office of Civilian Defense.

Purpose of the test campaigns was to determine just how much scrap can be collected per family if a nation-wide collection was undertaken. In the meantime, the OPM has requested that no local groups undertake such campaigns until the results of these two test cases are determined and proper machinery set up for such efforts.

Steel scrap people are said to be watching the aluminum collection project with considerable interest, feeling that if it proves successful a like collection of ferrous scrap might be made.

Madison Collects 40,000 Lb.

Madison, Wis.

• • • **Nearly 40,000 lb.** of pots and pans were piled on the Capitol lawn here as the result of the first few days drive to collect scrap aluminum from housewives. Officials here estimated the scrap aluminum collected was enough for one airplane. About 50 trucks collected scrap from central pick up points where housewives had deposited their cooking ware. Officials said the aluminum would be handled by a local scrap firm with no charge except for labor.

Cocktail Shakers Included

Richmond, Va.

• • • **The test scrap** aluminum collection made here by OPM yielded pots, pans, skates, cocktail shakers, parts of a World War I bomber and many other articles containing aluminum. Tonnages of scrap collected in the five-day campaign have not yet been computed, but they are expected to be high.

Metal Working Activity

. . . Latest Data Assembled by The Iron Age
From Recognized Sources. In Net Tons.

	March 1941	Feb. 1941	March 1940	3 Months 1941	3 Months 1940
Steel Ingots:					
Monthly output[a]	7,146,372	6,250,413	4,390,090	20,339,869	14,685,960
Average weekly output[a]	1,613,177	1,562,603	990,991	1,581,638	1,129,689
Per cent of capacity[a]	100	96.8	63.5	98.0	72.4
Pig Iron:					
Monthly output[b]	4,704,135	4,197,872	3,270,499	13,565,702	10,614,001
Raw Materials:					
Coke output[c]	5,584,909	4,998,491	4,259,848	16,030,389	13,377,238
Lake ore consumed[d]	7,180,915	6,353,946	4,578,299	20,625,601	15,253,184
Scrap iron consumed	5,221,440	4,673,000	3,055,360	14,685,440	10,215,520
Castings:					
Malleable, orders[e]	86,293	76,055	35,730	243,437	111,069
Steel, orders[e]	126,140	105,125	36,612	341,844	120,646
Finished Steel:					
Trackwork shipments[a]	10,225	7,973	8,446	25,033	22,106
Fabricated shape orders[f]	187,143	165,371	128,321	619,108	308,892
U. S. Steel Corp. shipments[g]	1,720,366	1,548,451	931,905	4,951,271	3,086,753
Fabricated Products:					
Automobile production[h]	533,912	485,523	423,620	1,567,271	1,259,931
Steel furniture shipments[e], value	$3,821,375	$3,368,019	$2,424,300	$10,341,407	$6,663,125
Steel boiler orders[e] (sq. ft.)	3,521,751	1,543,821	760,668	7,275,619	1,853,231
Locomotives ordered[i]	119	127	41	324	104
Freight cars ordered[i]	7,685	5,645	1,851	27,448	5,078
Foundry equipment index[k]	272.7	281.1	183.2	279.7	156.0†
Gear sales index	288	262	114	270†	118†
Non-Ferrous Metals: (U. S. only)					
Lead shipments[l]	62,090	54,859	46,353	172,660	125,404
Lead stocks[l]	45,996	46,604	74,692	.....	.....
Zinc shipments[m]	63,483	59,220	49,909	185,975	155,821
Zinc stocks[m]	6,969	7,086	72,144	.....	.....
Tin deliveries[n]	18,023	13,658	10,353	45,973	28,699
Refined copper deliveries[o]	134,333	112,808	64,376	366,877	219,019
Refined copper stocks[o]	89,873	97,689	159,795	.....	.....
Exports:					
Total iron and steel[p]	512,844	672,269	743,658	1,967,828	1,998,480
All rolled and finished steel[p]	283,458	323,338	357,722	923,289	966,341
Semi-finished steel[p]	186,028	199,531	115,027	697,991	278,535
Scrap[p]	54,383	83,303	231,579	188,148	650,212
Imports:					
Total iron and steel[p]	872	892	5,096	2,238	20,110
Pig iron[p]	.....	.....	583	.....	4,529
All rolled and finished steel[p]	5,041	607	2,474	6,350	6,159

Sources of data: [a] American Iron and Steel Institute; [b] The Iron Age; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by The Iron Age—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age*; [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

* Not available. † Monthly averages.
Figures in Italics represent a two months' period.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **Jesse J. Ricks,** formerly president of the Union Carbide & Carbon Corp., New York, has been elected chairman of the board. **Benjamin O'Shea,** formerly vice-president, was named as the new president. Both the new chairman and the new president have been associated with the corporation since its formation in 1917. **James A. Rafferty,** a vice-president, was elected to the board of directors to fill the vacancy caused by the resignation of **Matthew J. Carney. Robert W. White,** secretary and treasurer, was made a vice-president as well.

• **Thomas R. Miller** has been named Chicago district industrial engineer, succeeding **G. A. Whitehurst,** who has been transferred to Pittsburgh as assistant to chief engineer of the Carnegie-Illinois Steel Corp., Pittsburgh. Beginning his career in 1906 as an efficiency and operating engineer in New Castle, Pa., Mr. Miller was later transferred to the Minnesota Steel Co. in Duluth and in 1932 became superintendent of power for American Steel & Wire Co., United States Steel Corp. subsidiary, in Duluth. He became associated with the Gary Works of Carnegie-Illinois seven years ago.

• **Frank F. Trierweiler** has been appointed manager of the concrete reinforcing division of Joseph T. Ryerson & Son, Inc., Chicago, to take the place of E. W. Langdon who died on May 1. He will have general supervision of the reinforcing business at all Ryerson plants with headquarters at the Chicago office. Graduating from the University of Michigan's civil engineering department, he became associated with Thomas R. Kimball, architect, in Omaha, Neb. After a year with Kalman Steel Co. he entered the general contracting business at Portland, Ore., and in 1924 became associated with Joseph T. Ryerson & Son, Inc., in charge of reinforcing at the Ryerson Jersey City, N. J., plant.

FRANK F. TRIERWEILER, new manager of the concrete reinforcing division of Joseph T. Ryerson & Son, Inc.

• **R. Frank McKim** has been elected secretary of Reo Motors, Inc., Lansing, Mich., and will continue his present duties as assistant treasurer. Four new directors have been elected. They are **James Dervin, Joseph Shearer, Ray Potter** and **Birney Adams** of Lansing, succeeding **W. C. Wood,** of Lansing, **Otto Seyferth,** of Muskegon, and **A. L. Philp,** Detroit and the late **J. W. Wilford** of Lansing.

• **H. F. Wyman** has returned as plant superintendent of Alloy Fabricators, Inc., Perth Amboy, N. J., after an absence of two years.

• **Albert Leon** has been appointed manager of the export department of the Reynolds Metals Co., Richmond, Va. At the same time Robert W. Speir, Jr., was named assistant export manager. Both men have been members of the Reynolds organization for some time.

• **C. L. Wessbecher,** mechanical goods salesman in the New York district of the B. F. Goodrich Co., Akron, Ohio, is celebrating his 40th anniversary with the organization. **Fred Ranyard,** manager of mechanical goods, **H. G. Fosket,** mechanical goods salesman in the Seattle district and **M. C. Leitch,** stockman in the New York district offices, have completed 30 years of service with the company.

• **Eugene A. Gump,** formerly purchasing director for a number of important metal working concerns has been selected as Michigan's first non-political state purchasing director. Mr. Gump, who is 47 years old, has been a purchasing agent since 1912, having been associated with Willys-Overland Co., Toledo; Wilson Foundry & Machine Co., Pontiac, Mich.; Federal Motor Works, Indianapolis; and the Hurd Lock & Mfg. Co. His appointment is a result of recommendations made by a committee of purchasing agents from private industry who were called upon by the state to prepare a civil service plan for this office.

• **L. Frederick Gieg** has been named president of the National Can Co., New York, succeeding **Georges F. Doriot,** who was elected chairman of the board. Mr. Gieg formerly was president of the Crown Can Co. and the Acme Can Co.

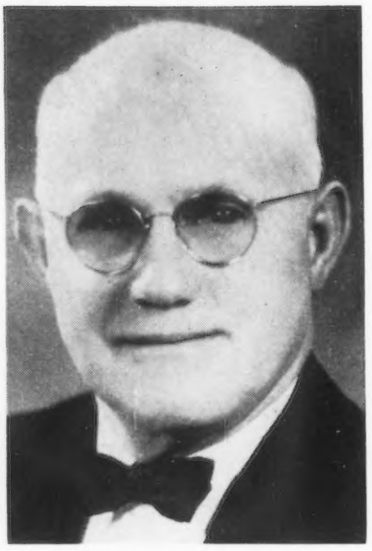
L. FREDERICK GIEG, president of National Can Co.

• **G. M. Fletcher,** advertising manager of the Stanley Works, New Britain, Conn., has been elected president of the Industrial Advertising and Marketing Council, Western New England chapter of the National Industrial Advertisers Association. Other officers elected were: **H. E. Merrill,** General Electric Co., first vice-president; **G. P. Lonergan,** Bristol Co., Waterbury, second vice-president, and **E. N. Bidwell,** Whitney Chain & Mfg. Co., Hartford, secretary-treasurer.

• **Arnold B. Keller,** treasurer of the International Harvester Co., Chicago, since 1932, has been elected vice-president and treasurer. **Karl O. Schreiber,** assistant to the vice-president in charge of manufacturing, was also elected vice-president. He will have supervision over the manufacturing department, industrial relations department, and industrial engineering and construction department.

Mr. Keller joined the Harvester company in 1913 as a member of the treasury staff and was made assistant treasurer in 1920. He was elected treasurer in 1932 and was made a director of the company in 1936. He has served continuously on the board since that time. Mr. Schreiber joined the Harvester company for the first time in 1917 as general foreman of the assembly division of a motor truck plant then located at Akron, Ohio. In 1920 he was appointed assistant superintendent of the motor truck plant at Springfield, Ohio. Two years later he resigned to become assistant to the president of the Westcott Motor Car Co. He returned to the Harvester company permanently in 1923 as assistant superintendent at Springfield and was made superintendent of that plant the following year. Mr. Schreiber went to the Chicago general office in 1936 as assistant works manager over the automotive group of Harvester plants. In 1940 he was appointed works manager of the tractor group of plants and on March 1 of this year he was appointed assistant to the vice-president.

• **Edward L. Bates** will retire June 1 from the investment and brokerage business to become an active vice-president of Fostoria Pressed Steel Corp., Fostoria, Ohio.



JAMES G. COFFMAN, of the Los Angeles Steel Casting Co., Los Angeles, who has been elected a director of the American Foundrymen's Association.

• **Ernest M. Hommel** has been elected president of the O. Hommel Co., Pittsburgh, filling the vacancy caused by the death of his father, Oscar Hommel. Mr. Hommel has been actively associated with this company for the last 18 years as a sales representative and since 1929 has been vice-president.

• **Phillips G. Stryker** has joined the sales and service department of the O. Hommel Co., Pittsburgh. Mr. Stryker was employed in the research department of the General Electric Co., Schnectady, from 1925 to 1928 when he joined the Hanovia Chemical and Mfg. Co. as sales representative.

• **Samuel W. Moore,** formerly assistant master mechanic, Jessop Steel Co., Washington, Pa., has been made construction engineer in charge of plant rehabilitation and new construction. He has been with Jessop Steel for 14 years.

• **Charles B. Stiffler** has been appointed general assistant comptroller of General Motors Corp., Detroit. Mr. Stiffler has been with General Motors Corp. since 1919 when he was employed in the Central Office accounting department. He served in various capacities in the accounting departments of the Pontiac and Buick motor divisions and in 1936 was made assistant general manager of United Motors Service. In 1938 he became United Motors general manager. He will be succeeded as general manager of United Motors Service by **Walter N. Potter,** who has been vice-president and general sales manager of that division since 1938. Mr. Potter joined United Motors in 1919. He successively held positions as assistant to the general sales manager and as manager of the product department and director of sales. **Wallace G. Kileen** has been appointed assistant comptroller of the corporation in charge of the cost accounting section. Mr. Kileen has been connected with the Central Office cost section since he came with General Motors Corp. in 1922. **J. A. Sarason** was appointed assistant comptroller of the corporation in charge of Central office general accounting section. Mr. Sarason was employed by General Motors Corp. in 1922 and has been in the general accounting section of the Central Office since that time.

• **D. A. Kalton** and **A. W. Thomas** have been made assistants to the sales manager of the construction equipment division of the Chain Belt Co., Milwaukee. Mr. Kalton has been with Chain Belt since his graduation from Marquette University in 1932 and has served both the home office department and as Eastern district manager. Mr. Thomas has been connected with the company since 1927 in the sales and engineering departments of the construction equipment division.

• **William J. Hawley,** who has been with the Kent Owens Machine Co., Toledo, Ohio, for 14 years, has been appointed sales engineer.

• **Joseph J. Davies** has been appointed purchasing agent of the Tube Reducing Corp., Newark, N. J. Mr. Davies joined the Mathews Conveyor Co. in 1924 where he served in the purchasing department. In 1933 he became associated with the general sales office of the Babcock & Wilcox Tube Co.

• **Peter V. Martin,** who has been associated with the Carnegie-Illinois Steel Corp. for the past 26 years, has been appointed superintendent of the Gary steel works blast furnaces, succeeding the late W. H. Geesman. He started as a messenger in the Cincinnati office of the company and

later worked as a sampler in Pittsburgh. He was then transferred to the South Chicago works, where he worked his way through the ranks to the position of assistant superintendent of blast furnaces. He was transferred to Gary steel works two years ago as assistant divisional superintendent of coke plant, blast furnaces and docks. He was graduated from Massachusetts Institute of Technology with a degree in metallurgy and took postgraduate work at Northwestern University and Armour Institute of Technology.

• **Thomas R. Miller** has been appointed Chicago district industrial engineer of Carnegie-Illinois Steel Corp., succeeding **G. A. Whitehurst**, who recently was transferred to Pittsburgh to become assistant to the chief engineer. Mr. Miller has been associated with the Gary steel works of Carnegie-Illinois for the last seven years. He began as a mechanical designer, then advanced to the position of plant industrial engineer and also served as assistant division superintendent of the west mills, including the merchant mills. He leaves the position of superintendent of the maintenance division in the Gary plant to assume his duties in Chicago.

• **H. J. Hooks,** president of Wolverine Tube Co., Detroit, has resigned that post because of ill health. He is being succeeded by **Charles C. Limbocker,** who will continue as chairman of the board. Mr. Hooks has been associated with Wolverine Tube since 1919, first as secretary and treasurer and latterly as president. **George H. Klein** has been elected a member of the board.

• **Henry A. Raymond,** Cleveland-Cliffs Iron Co., has been elected a director of Air Reduction Inc., New York.

• **S. E. Skinner,** Oldsmobile's general manager, has been named alumni trustee of Rensselaer Polytechnic Institute. He received his final degree as mechanical engineer from Rensselaer Polytechnic in 1920, having returned to graduate after two years of service in the United States Navy in the first World War.

• **Richard Doughton** has been appointed associate analyst, Iron and Steel Priorities Section, in the OPM, Washington. He was formerly associated with Bethlehem Shipbuilding Corp., Quincy, Mass., and for the past several years was with Jones & Laughlin Steel Corp., Pittsburgh, as metallurgist and special sales representative.

• **Benjamin P. Hammond** has been appointed Eastern district steel casting sales representative of the Continental Roll & Steel Foundry Co. with headquarters at 11 Edgewood Terrace, Maplewood, N. J. He worked previously in the Pittsburgh office of the company.

• **Hollis U. Gordon** and **Chester L. Glover** have been appointed agents in Chicago for the National Broach & Machine Co., Detroit, and the Cone Automatic Machine Co., Windsor, Vt. They will have their sales offices at 565 West Washington Boulevard, and will be assisted by **C. E. Hartley,** who has had many years of experience in the machine tool industry.

• **Daniel V. Maher** has been made factory representative for Ohio for the Clover Mfg. Co., Norwalk, Conn. He will make his headquarters at 912 Marshall Building, Cleveland.

• **John W. Baer** has been appointed Chicago district sales manager, succeeding the late John C. Glass, for the Midvale Co., Philadelphia.

• **Eugene Caldwell,** for the past nine years general manager of the Wrought Washer Mfg. Co., Milwaukee, has resigned to assume a similar position with the Willamette Hyster Co., Portland, Ore., manufacturer of hoists and lumber moving machinery.

• **B. D. Christian,** heretofore vice-president and general manager of Safway Steel Scaffolds Co., Milwaukee, has been elected president of the firm. He formerly was vice-president of the Crocker-Wheeler Electric Mfg. Co., Ampere, N. J. **C. A. Jones** has been made vice-president; **J. Victor Loewi,** treasurer, and **Henry M. Blume** has been reelected secretary.

• **W. D. James,** president and general manager of the James Mfg. Co., Fort Atkinson, Wis., was elected president of the Wisconsin Manufacturers association, at its recent Milwaukee meeting.

Obituary

The late ALFRED WYNN MINUSE, assistant manager of sales of the New York office, Republic Steel Corp., whose death was announced in these columns last week.

• **John Barrow,** president of the Columbiana Boiler Co., Columbiana, Ohio, died at St. Petersburg, Fla., May 28, aged 76 years. He founded the company in 1864.

• **Edward G. Buckwell,** retired secretary and general sales manager of Cleveland Twist Drill Co., and a member of its board, died May 28 at his residence in Cleveland. Born in Knoxville, Tenn., 82 years ago, Mr. Buckwell entered the tool sales field as a salesman for the Sargent Co., New Haven, Conn., and later operated his own hardware firm in Knoxville.

• **Robert M. Peterson,** assistant advertising manager of the American Steel & Wire Co., Cleveland, died suddenly at Scottdale, Pa., on May 30, aged 52 years. His earliest business experience was with the Mahoning Foundry Co. and Republic Iron & Steel Co. In 1918 he became associated with the MacDonald works of the Carnegie-Illinois Steel Corp. and later joined General Fireproofing Co. He joined the sales promotion and advertising department of the Steel & Wire company in 1934.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	June 3, 1941	May 27, 1941	May 6, 1941	June 4, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	June 3, 1941	May 27, 1941	May 6, 1941	June 4, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$19.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	19.00
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.75
Carwheels, Chicago	....	....	....	19.00
Carwheels, Philadelphia	....	....	....	20.75
No. 1 cast, Pittsburgh	22.00	22.00	23.25	19.25
No. 1 cast, Philadelphia	24.00	24.00	24.00	20.75
No. 1 cast, Ch'go*	21.00	21.00	22.60	17.00

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$5.625	$4.00
Foundry coke, prompt	6.875	6.875	6.25	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	52.25	52.125	52.00	55.00
Zinc, East St. Louis	7.25	7.25	7.25	6.25
Lead, St. Louis	5.70	5.70	5.70	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 144-150 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 3, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26c. a Lb.	$22.61 a Gross Ton	$18.58 a Gross Ton

	High	Low	High	Low	High	Low
1941			$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.261c., Jan. 2	2.211c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Mills look to Washington for prompt action on plate priorities . . . Non-defense tonnage forced steel farther into background . . . Operations rise a half point to 99½ per cent . . . Dunn report to President includes civilian steel shipment figures for 1940, estimates for 1941 and 1942.

STEEL producers and consumers this week are attempting to analyze a series of new developments which point to a further drastic curtailment in steel for commercial consumption and the establishment of mandatory priorities. What steel manufacturers would like to see is an authoritative statement from Washington as to which defense needs the steel industry should fill first. They hope for prompt and decisive action on mandatory priorities for steel plates and structural materials and eventually on other products.

How the need for a straightening out of steel distribution is growing is shown by the second Gano Dunn report to President Roosevelt on the adequacy of the nation's steel capacity. A highlight of the Dunn report is an estimate by the American Iron and Steel Institute's Commercial Research Committee on civilian steel requirements for various industries for 1941 and 1942 and its report on steel distribution for last year. The committee reports, for example, that automobile trucks and mechanized military equipment, excluding tanks, took approximately 10.6 millions of tons of ingots in 1940 and will require 11 million tons in 1941 and 9 million tons in 1942. The construction industry, aside from public utility work and shipbuilding, received 6.9 million tons in 1940, but will take 9.4 million tons in 1941 and 8.1 million tons in 1942. Jobbers, dealers and distributers took 8.8 million tons last year, and will take an estimated 11.8 million tons in 1941 and 12.3 million tons in 1942.

THE latest steel capacity report of Mr. Dunn, OPM steel consultant, found that passage of the Lease-Lend Act and further increases in the defense program have caused a sharp increase in steel requirements for both military and civilian use. As a consequence, the report finds a deficit of 1.4 million tons for 1941, as compared with a surplus of 10.1 million tons estimated in the first report to the President earlier this year.

The Office of Production Management's general steel order of the past week is interpreted as formally defining from a governmental standpoint an actual practice which has been in effect in the steel industry for several months. The order is considered merely a forerunner of stronger measures. Last week's rearrangement of priorities will not have any broad effect immediately upon steel mill production practices but may slow up some of the non-defense inquiries which have been flowing into sales offices. Meanwhile, non-essential tonnage has been forced farther and farther into the background by the growing weight of the defense program.

Broadened authority was given the OPM Priorities Division, headed by Edward R. Stettinius, Jr., on Monday when the President signed the Mandatory Priorities Bill. At the same time the President signed a bill permitting Canadian ships to carry iron ore from American ports to lower lake ports during the 1941 season. Pressing demand for ore for blast furnace and steel production prompted this unusual legislation. When the President acted the Lake Superior iron ore fleet had just completed May shipments totaling 11,081,199 gross tons, a new all-time monthly record which may bring the ore movement to as much as 75 million tons before the navigation season ends.

Output of coke pig iron in May totaled 4,599,966 net tons, equal to 93.8 per cent of capacity, as compared with 4,334,267 tons or 91.8 per cent in April. Daily output in May was 2.7 per cent over April.

MORE than 850,000 tons of pipe line, one representing 500,000 tons of 24-in., and the other around 350,000 tons of 20-in. pipe, both running from Texas to the Atlantic Coast, is expected to be formally allocated in the next few days, climaxing a month in which the pipe market, one of the blackest spots in the steel picture of the 1930's, found inquiries and orders at an all-time peak. However, pipe mills, like other steel plant departments, face a lack of raw steel.

At Washington defense agency officials continue to debate the question of supplying preferential treatment on plates for freight car builders, with the 23,705 freight cars ordered in May equaling any half year total from 1936 through 1939. In addition to the two freight car shops which have been shut down for several weeks due to lack of steel plates, another large unit was forced to stop operations last week because of lack of material. Another car builder will shut down his production lines this week, his fabricating shop having gone down two weeks ago.

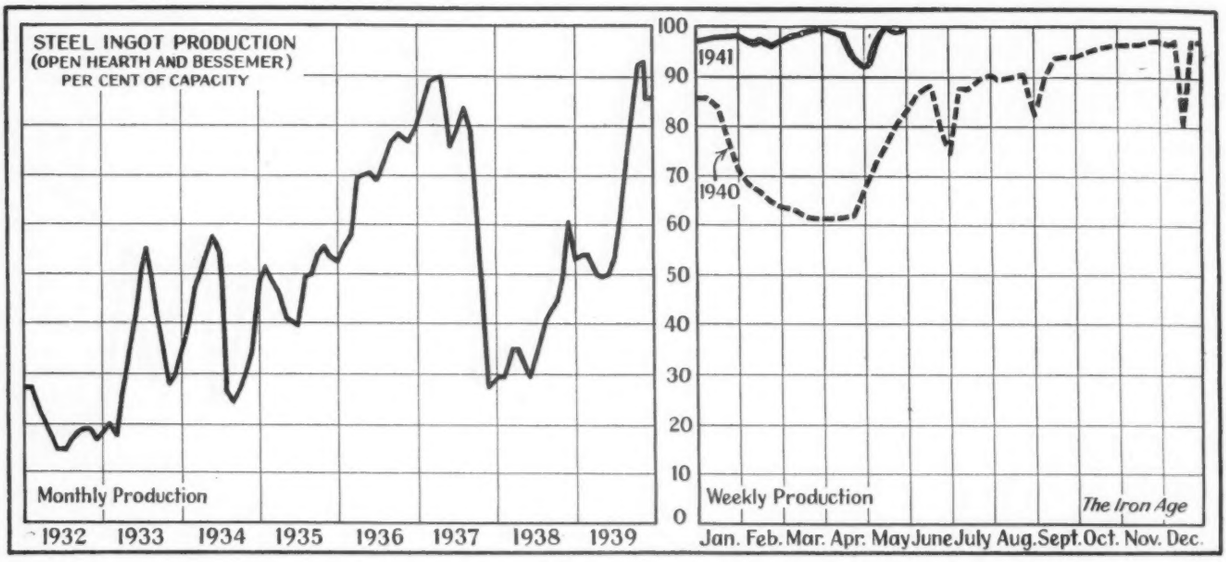
Steel ingot production this week rose a half point to 99½ per cent, largely due to a five point gain in the Detroit district. THE IRON AGE scrap composite remains unchanged at $19.17.

The Industrial Pace . . .

Output of capital goods industries suffered last week from the Friday holiday, but average daily production held up to the previous week's level. Usual pre-holiday effect on activity, which in the past has acted to cause some reduction in production in the day preceding the holiday, was notably lacking in the past week. Another factor acting to support the index at its present position is the generally declining seasonal trends at this time, against well maintained industrial production.

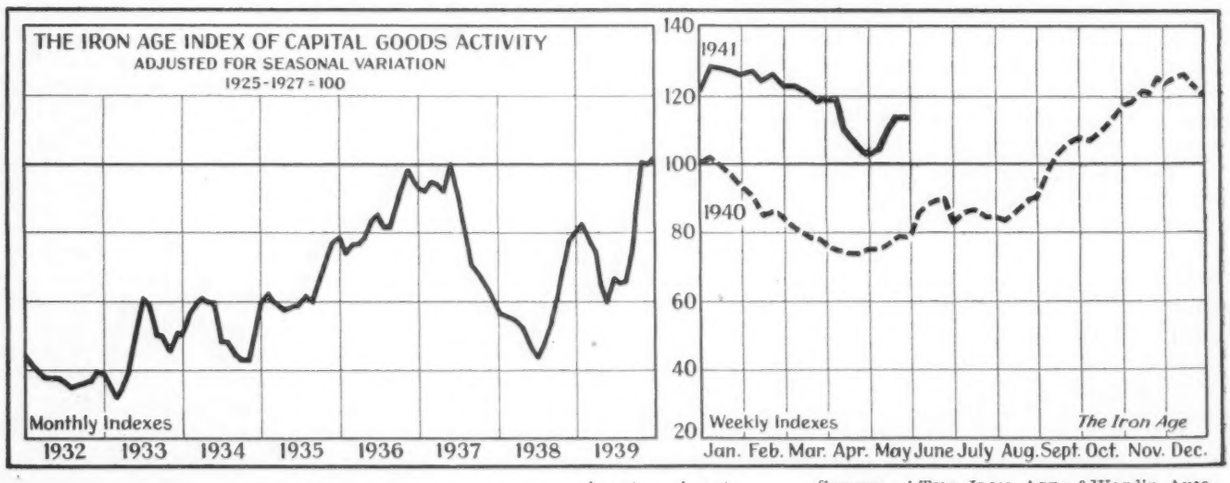
Daily average automobile production last week was 26,599 units, against 26,712 in the preceding week. The past week's total output amounted to 106,395 cars. The steady daily rate, adjusted against a declining trend, resulted in a small gain in the automobile factor last week. Construction contracts showed a slight gain in total volume, amounting to $70,368,000 as compared with $52,346,000 in the preceding week, but the week's total was still substantially below the heavy volume of March and April, causing the adjusted index for this component to ease further last week. Steel production, Pittsburgh and forest products carloadings all showed small gains, due largely to seasonal adjustments.

Operations Recover ½ Point to 99.5%


STEEL INGOT PRODUCTION
(OPEN HEARTH AND BESSEMER)
PER CENT OF CAPACITY
Monthly Production
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Production
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
100 90 80 70 60 50 40 30 20 10 0

District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week ..	101.0	100.5	99.0	97.0	95.0	106.0	85.0	109.0	99.0	102.0	102.5	111.0	95.5	**99.5**
Previous Week..	101.0	101.0	99.0	96.0	97.0	106.0	85.0	104.0	99.0	91.5	102.5	111.0	95.5	**99.0**

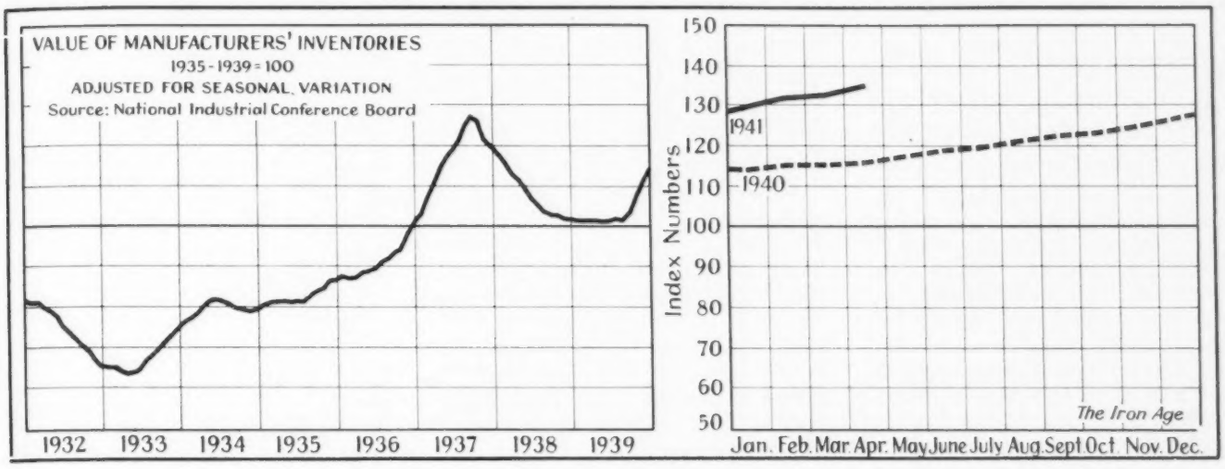
Index Holds Unchanged in Holiday Week


THE IRON AGE INDEX OF CAPITAL GOODS ACTIVITY
ADJUSTED FOR SEASONAL VARIATION
1925-1927 = 100
Monthly Indexes
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Indexes
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
140 120 100 80 60 40 20

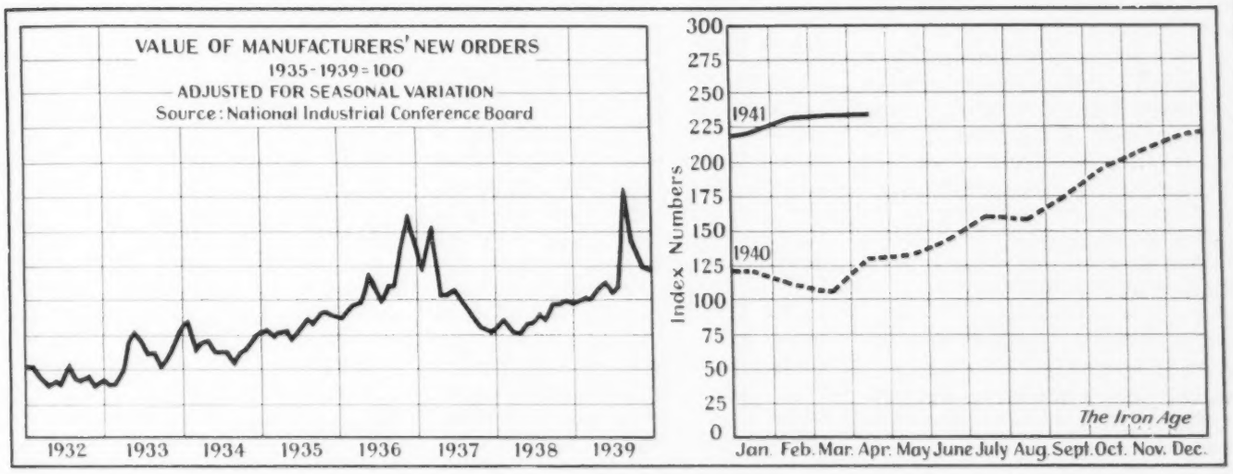
▼ Component — Week Ended ➔	May 31	May 24	May 3	June 1 1940	June 1 1929
Steel ingot production[1]	136.8	136.1	126.0	104.1	131.1
Automobile production[2]	115.5	114.3	108.1	66.2	109.9
Construction contracts[3]	109.2	112.9	128.6	63.4	125.2
Forest products carloadings[4]	73.9	73.2	71.6	61.4	111.2
Pittsburgh output and shipments[5]	129.3	127.8	93.4	94.4	124.4
COMBINED INDEX	112.9	112.9	105.5	77.9	120.4

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended April 26. Other indexes cover week of May 3.

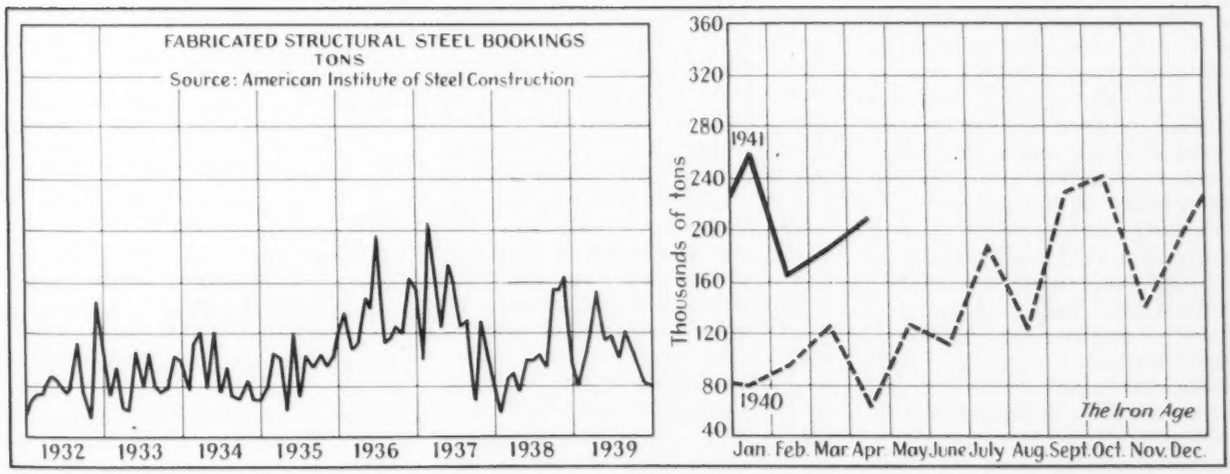
April Inventories Rose 1.6% to New Peak


VALUE OF MANUFACTURERS' INVENTORIES
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
150 140 130 120 110 100 90 80 70 60 50
1941
1940
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
The Iron Age

Manufacturers' Orders 87% Above Year Ago


VALUE OF MANUFACTURERS' NEW ORDERS
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
300 275 250 225 200 175 150 125 100 75 50 25 0
1941
1940
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
The Iron Age

April Structural Bookings Rise Moderately


FABRICATED STRUCTURAL STEEL BOOKINGS
TONS
Source: American Institute of Steel Construction
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of tons
360 320 280 240 200 160 120 80 40
1941
1940
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
The Iron Age

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

Pig Iron

. . . Second Dunn report says furnace capacity is catching up

Gano Dunn, in his second report to President Roosevelt, declares that the 2.3 per cent deficit of blast furnace capacity needed to balance the "reliable" industry capacity as of Dec. 31, 1940, has now declined to 0.2 per cent. Blast furnace capacity blown in since Mr. Dunn's first report was written, plus the increased capacity now under construction for completion by Dec. 31, 1941, reduced the deficit. Mr. Dunn reports a shortage of pig iron for increased consumption of the iron foundries, noting that the foundries are being forced to increase the proportion of scrap in their furnace charges.

At YOUNGSTOWN it was expected the No. 1 stack of Youngstown Sheet and Tube Co. at Campbell would be blown in this week after idleness since late April for partial relining. The furnace would help furnish more hot metal for open hearths. Republic Steel Corp. probably will have its No. 4 blast furnace completed about June 15.

The pig iron situation in the SOUTHERN OHIO district is becoming tighter, although no curtailment in foundry operations has yet been reported, because of material shortages. Suppliers are doing a yeoman's job in shuttling available materials to the various foundries to keep them in operation, but with fuel difficulties settled, the feeling generally is that shipments in line with contracts will be available in a very short time. Foundry operations show no diminution and plants are running at full capacity.

Melters on the ST. LOUIS area continue to take in all the iron they can get, and makers are allocating their supplies, so that all may get their actual requirements.

Tennessee Coal, Iron & Railroad Co. is taking out its No. 2 blast furnace at Ensley, effective Sunday, for relining and general repairs, together with enlargement, and will increase its rated capacity from 675 tons a day to between 900 and 1000 tons a day. The program is expected to require about 90 days. With the Ensley furnace down, this will leave the Birmingham district with 17 blast furnaces and practically no stocked iron except for small scatterings.

Hanna Furnace Co., pig iron division of the National Steel Corp., last week relighted its No. 1 stack, blown out in 1929 and recently reconditioned at a cost of $500,000. The same day, however, this company blew out No. 2 furnace for minor repairs which may be completed within the next two to three weeks. This furnace now is the only inactive blast stack in the Buffalo district.

New Business

. . . Steel bookings continue above production and shipments

Although total bookings in May ran from 15 to 20 per cent below April volume at PITTSBURGH, specifications have increased in number and tonnage within the past week or so. Despite the definite possibility that many commercial users will find it increasingly difficult to obtain much, if any, steel for non-essential uses, the avalanche of steel bookings continues somewhat above either production or shipments. The OPM order specifying that consumers who are unable to obtain steel supplies should furnish affidavits from steel companies as to why they can't supply the material is expected to result in another case of increased "paper work" which will utilize the time of clerical forces urgently needed on other matters. The order to the effect that national defense and essential non-defense demand must be met first is a Washington reflection of what has been going on within the steel industry on a voluntary basis for several months.

At CLEVELAND it was said last week's rearrangement of priorities will not have any vast effect immediately upon steel mill production practices, but may slow up some of the non-defense inquiries which have been flowing into sales offices. Non-essential tonnage has been forced farther and farther into the background recently by the weight of the defense program. The zinc situation continues to be one of the most critical of all problems facing the steel industry, reports CLEVELAND. Even some government specifications calling for zinc may be forcibly revised.

Fresh orders at CHICAGO are not increasing as non-defense demands continue their slide. Within the short space of the past month a definite change has come into the general feeling of steelmen. Thirty days ago there was still the opinion that at least some of the "business as usual" stand could be preserved. That's true no longer.

Little new export business has been placed lately, outside of the British war needs, due to uncertainties over what export price will be allowed by OPACS. Some small lots of resale material have been placed for export at prices substantially above the domestic level. An inquiry for about 1000 tons of ship plates for Uruguay is still unplaced. This material is needed to repair a German merchant ship which was scuttled off the South American coast and later raised by Uruguay. An effort is being made to obtain a preference rating from OPM for this material.

Allocation of 1,000,000 tons of steel for Britain on which quotations have been received by the Procurement Division will not be made before the end of the present week, if then.

The only new business which consumers in the ST. LOUIS industrial district are attempting to place is structural shapes, factors realizing the difficulties of getting deliveries.

New orders remain substantially above shipments in the EASTERN PENNSYLVANIA area, by as much as 50 to 100 per cent. Additional ship tonnages are coming into this area, and the demand from railroads is on the increase. Orders for forging bar stock for shells are rising rapidly, as are orders for cold drawn screw machine stock for turning smaller caliber projectiles in automatics. Pressure for delivery is so great from all quarters that most sellers would welcome formal government priorities on all steel products.

Iron Ore

. . . Superior shipments shatter all records in May

Vessel shipments of Lake Superior iron ore shattered all previous records during May when 11,081,199 gross tons were carried on the Great Lakes, including about 75,000 tons of Canadian ore, according to the latest report of the Lake Superior Iron Ore Association.

With the season off to such a fine start, it is believed likely the American ore fleet will carry around 75,000,000 tons before navigation closes. The law recently signed permitting Canadian ships to carry ore between U. S. ports may enable an even heavier movement, although as matters stand at present a number of questions must be ironed out before much assistance can be rendered.

The cumulative total of vessel shipments for this season to date is 18,035,992 gross tons, including about 100,000 of Canadian ore, against 7,743,196 gross tons to June 1 of last year. This is an increase of 132 per cent and a tonnage gain of 10,292,796.

The previous monthly all-time record for shipments was August, 1937, when 10,811,381 tons were loaded at Upper Lake docks.

Around 100,000 tons of "hard" iron ore in stock piles of the Oliver Iron Mining Co., U. S. Steel Corp. subsidiary, have been acquired by the Cleveland-Cliffs Iron Co. This type of ore is used principally in open hearths. The stock piles are at the Champion mine in Marquette County, Mich. Some of the ore will be brought to the lower lakes this season.

Semi-Finished Steel

. . . Burden grows for steel plant scheduling departments

All the ingenuity built up in years of experience by steel scheduling departments is being needed currently in order to keep a semblance of equitable distribution of available semi-finished steel supplies. With ship building, munition, freight car, and pipe line demands increasing, the task of properly assigning available steel supplies becomes most difficult in the entire program.

Wire Products

. . . Pickup reported in spring wire and wire rope

Wire drawing operations at the close of May reached a new peak, reports CLEVELAND. Meanwhile, orders continue to flow in to sellers at an unceasingly brisk rate. The month closed with a decided pick-up in a number of items such as spring wire and wire rope. Demand continues to outdistance production and shipments at PITTSBURGH. Wire departments in large integrated mills are finding it tough going, in view of the heavy national defense demand for other steel products. Commercial wire users are bound to be affected soon owing to the increasingly larger percentage of wire and wire products going into the armament program.

Tubular Goods

. . . Long lines will further increase demand on mills

Official allocation of the 500,000 ton, 24-in. crude oil line to run from Texas to New Jersey is expected this week. Prompt action is also expected on the 350,000 ton, 20-in. line to run from Texas to New York. Tubular goods demand is reaching an all-time high owing to strong standard pipe, line pipe, and casing requirements. Oil companies are expected to cooperate fully with the OPM's request that they cut down casing needs by at least 20 per cent, thus allowing the steel to be put on urgent line pipe orders. Line pipe demand not associated with national defense is finding few if any takers. A bill to be considered by Congress provides for condemnation of land needed for the proposed gasoline and oil pipe line from the Gulf States to the northeastern States.

Backlogs have grown during the past week at principal OHIO mills. The month of May will long be remembered by tubular goods sellers as a month when inquiries and orders reached an all-time peak. Some of the leading producers at PITTSBURGH, YOUNGSTOWN and CLEVELAND never thought they would see the day when line pipe inquiries would be turned down right and left, but at present such a situation exists as a result of the developments during the past month. Getting adequate supplies of raw steel for pipe mills and meeting desired delivery promises present serious problems for some producers at the present time.

Steel for the 1500-mile crude oil line from Texas to the Atlantic Coast is reported to have gone to National Tube Co. and Republic Steel Corp., since fabricators were unable to get delivery promises in order to bid. Proposed long gas pipe line to run into CHICAGO may be abandoned due to inability to get steel. Line pipe demand in that district is very high.

Plates

Such a tight condition exists in the plate market, reports CLEVELAND, that difficulty has been encountered in obtaining material for a blast furnace, announced several months ago. A deal is in the air whereby one company may supply slabs for rolling at the plate mill of another steel producer in order to facilitate construction of the furnace. Because of the overwhelming demand from shipyards, car builders, boiler makers and line pipe contractors, all of which far exceed the normal output of the nation's plate mills, definitions of what is most vital and specific allocations to continuous mills and skelp mills are believed likely to come in the near future.

Despite the jam, it is possible to obtain fairly quickly flanged and dish heads for boilers or tanks.

Three CHICAGO mills are rolling plates on continuous mills to ease the tight burden in plates. One mill is handling up to ¾ in. thicknesses and letting fabricators do the shearing. Others are putting plates on sheet mills up to 5/16 in. thickness. More and more of this conversion is expected to take place there daily. If shipyards could handle their finishing, steelmen there believe that thicker ship plate could be put on more continuous mills. One exclusive sheet mill is now making plans to produce 40,000 tons of plates per month, production expected about the end of this year. Other sheet specialists are also planning conversion steps to help open up the defense bottleneck on plates which gets more serious each week.

Typical of how mills and fabricators are cooperating on the plate

situation is this example: Several thousand tons of different size gusset plates ordered for a bomber plant were placed with a plate mill. Fabricator was advised that delivery could be made quicker by running on continuous mills and sizes were standardized so that this could be done.

Plate makers in EASTERN PENNSYLVANIA as far as general business is concerned are booked to the end of the year, but have allowed space in their schedules for low priority items, like plates for gun mounts, which can be obtained for this and similar purposes on a three month delivery basis. Some sheet mills which agreed to roll a limited amount of plate on continuous mills have withdrawan from the market. Steel for the 123 Maritime Commission boats let last week has been allocated to the mills by OPM. Railroad buying is increasingly important, but it appears the roads will have to have some assistance from the government to obtain better deliveries.

Sheets and Strip

. . . Ship plate allocations affect high speed mill sheet output

The automobile industry continues to exert more and more pressure for shipment of material now on the books and the delivery question in general for commercial customers has reached the point where many users can obtain no definite information as to when their sheets will reach them. At least this is the situation at steel companies with high speed mills who have had substantial tonnages of ship plates allocated to them. Despite the inability of sheet makers to assure customers of any definite delivery, no matter how far into the future, actual sheet specifications in May exceeded the volume placed in April. Not only has plate tonnage affected sheet production but sheet orders with preference ratings for national defense are becoming an increasingly larger percentage of the total business being booked.

More than 10 per cent of sheet production in CHICAGO is now going to defense. Though still not relatively important in tonnage, leading mills there are converting more continuous capacity to plate-making. Aside from that, sheets are going into housing, trucks, railroad cars, practice bombs, etc., which are all actually defense items. No delivery changes were announced there this week.

Southern Ohio sheet interests are taking all the defense orders that are being placed with them and so far report no trouble in taking care of the defense needs. As defense orders continue to pile up, this naturally takes a large portion of the present rolling schedules and therefore must necessarily shove aside normal demands. One company in the area indicates that domestic demands were from 30 to 50 per cent above mill ability to deliver and accordingly had to be scaled down and apportioned. The President's speech of Tuesday, and his emergency proclamation have so far not changed the picture in this area, although the steel industry here generally approved of the President's attitude.

Merchant Bars

. . . Heavy inquiries reported at Cleveland

Heavy orders for cold finished stock for 20 mm. shell production, and a flood of inquiries for diversified projects requiring hot rolled bars, distinguished the past week at CLEVELAND. Bars for marine boilers run up into hundreds of tons and will add further to the heavy backlogs of defense business. Non-armament orders are being shoved back steadily on mill schedules and some have been postponed many times.

Some bar customers without national defense business have been told that their ability to obtain bars in the future for pure commercial uses will be clouded somewhat by heavy defense demand and no definite promises on delivery can be given. So many preference ratings have been handed out at Washington that priorities A-1C and lower are becoming meaningless in view of the great number of existing A-1A and A-1B preference ratings. PITTSBURGH bar makers report available bar capacity jammed ahead into 1942.

Alloy orders fell off slightly last week in CHICAGO—with defense and automotive demand still dominating the market. Railroad maintenance orders are sizable.

Tin Plate

. . . Allocation of British business is under way

Cold reduction tin plate activity is above 100 per cent of rated capacity. Allocation of British business which, when present commitments are subtracted, will amount to about 26,000 tons a month, is now in the process of being made.

Partial and temporary operation of the Shenango tin plate plant of Carnegie-Illinois Steel Corp. at New Castle, Pa., will be resumed on June 16. Twenty of the plant's 40 hot mills and other facilities for tin plate production will be placed in operation as soon as reconditioning now in progress is completed.

Structural Steel

. . . Awards drop to 11,100 tons, second lowest this year

Fabricated structural steel awards of 11,100 tons this week are the lowest since March and the second lowest this year. Largest lettings are 2200 tons at Pittsfield, Mass., for General Electric Co.'s plant; 1600 tons at North Creek, N. Y., for a concentrating plant for National Lead Co., and 1500 tons for a Neoprene plant at Louisville, Ky., for E. I. du Pont de Nemours & Co.

New structural steel projects advanced to 27,300 tons this week from 19,850 tons last week. Sizable new jobs are 11,000 tons for tremie trusses at the Brooklyn Navy Yard for dry docks No. 5 and 6; 5500 tons for a state bridge at Peoria, Ill.; 1500 tons for a bomber plant at Memphis, Tenn., and 1000 tons at Phoenix, Ariz., for the Goodyear Tire & Rubber plant.

Reinforcing Steel

. . . New projects drop sharply to 1400 tons

Reinforcing steel awards of 8300 tons this week include 1800 tons for the Lincoln Court housing project at Cincinnati; 1767 tons for the Orchard Park housing project at Roxbury, Mass., and 1200 tons for the Long Island Railroad subway in Brooklyn. New reinforcing steel projects call for only 1400 tons and include no inquiry of more than 355 tons.

Railroad Buying

. . . Four car building shops down due to lack of steel

Two more freight car building shops have been forced down within the past week due to lack of steel, making a total of four, the other two having been previously reported in THE IRON AGE. Another major car shop may be forced to curtail operations within two weeks unless freight car material is received. The continued lack of definite information from Washington on the question of granting car builders preferential treatment has resulted in a definite and serious slowing up in the production of freight cars already on order. The situation will become more serious unless definite relief is forthcoming promptly. With 23,705 freight cars placed during the month of May, a greater number of cars were ordered than at any time since September, 1939, when 24,200 cars were bought. During the first five months of this year American railroads have ordered 67,593 freight cars or roughly 2000 more than during the entire year of 1940.

For this week alone purchases of 8000 freight cars and 42 locomotives are reported, with new inquiries for some 4000 cars and 15 locomotives. Great Northern bought 2000 50-ton box cars; 1000 from Pullman-Standard Car Mfg. Co., 500 from General American Transportation Corp. and 500 from Pressed Steel Car Co.

Atchison, Topeka & Santa Fe ordered 2000 box cars from Pullman-Standard. Missouri Pacific placed 200 auto and 50 hopper with Mt. Vernon Car Co., and 800 box cars with American Car & Foundry Co. Western Pacific ordered 350 box and 300 flat cars from Mt. Vernon Car Co., and Elgin, Joliet & Eastern 250 gondolas from American Car & Foundry and 250 hoppers from Ralston Steel Car Co.

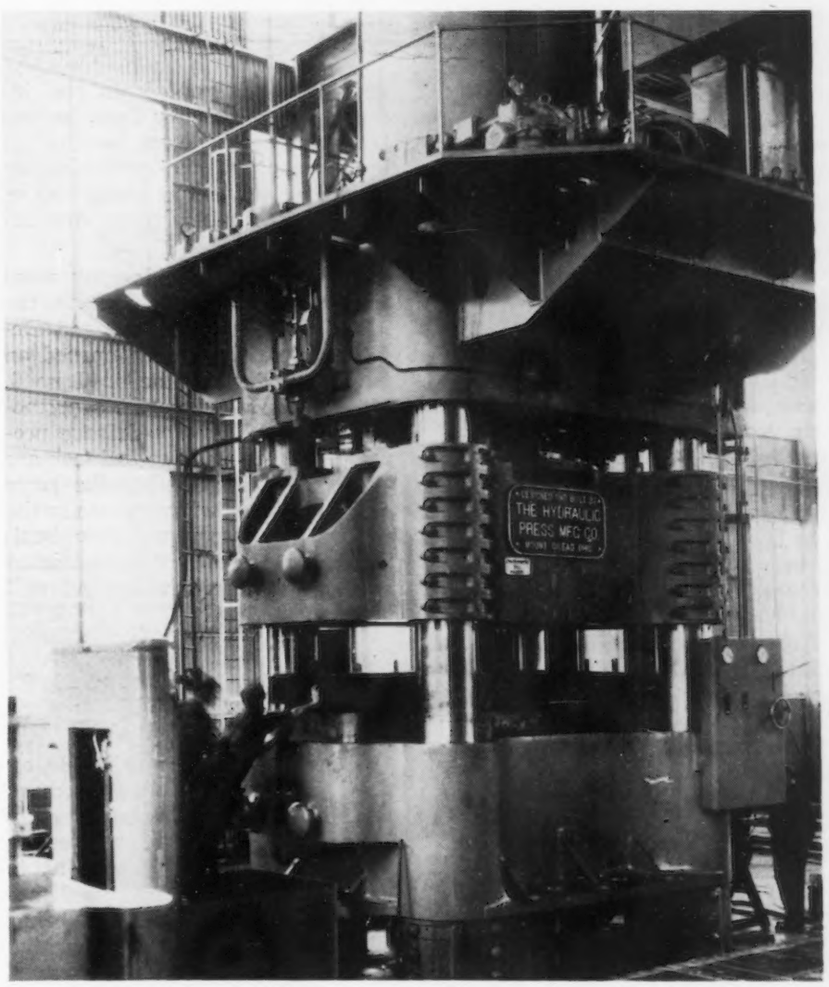
Maine Central purchased 400 40-ton box cars from Magor Car Corp. and 100 50-ton hopper cars from Bethlehem Steel Co. Lehigh & New England took 100 70-ton covered cement bars from American Car & Foundry and 300 hoppers from Pressed Steel Car Co. Southern bought 100 70-ton cement cars from Greenville Steel Car Co.

Nashville, Chattanooga & St. Louis ordered 500 box and 300 gondola cars from Pullman-Standard and five diesel-electric locomotives. Three will be supplied by Baldwin and two by Electro-Motive. This road is also inquiring for 10 4-8-4 type steam locomotives.

Louisville & Nashville distributed an order for 12 660-hp. diesel-electric switching locomotives evenly between Baldwin, American Locomotive and Electro-Motive, and is in the market for 18 to 22 steam passenger locomotives. Union Pacific ordered 20 4-6-6-4 type steam locomotives from American Locomotive.

Kansas City Southern bought two 2000-hp. and two 1000-hp. units from Electro-Motive and the Government placed one 4-8-2 locomotive for the Alaska railroad with Baldwin.

Pending orders include: New York Central, 1500 cars; Gulf, Mobile & Ohio, 1050 cars; Norfolk & Western, 1000 hoppers; Central of Georgia, 250; Denver & Rio Grande Western, 100, and Akron, Canton & Youngstown, 100 freight cars. New York, Chicago & St. Louis is in the market for 15 2-8-4 locomotives.



FOR R. A. F. FUSELAGES: An exact duplicate of the 5000-ton H-P-M Fastraverse hydraulic press originally built for Douglas Aircraft in 1937 for use with the Guerin process of shallow forming and blanking with a rubber pad has recently been shipped to an English aircraft factory for forming fuselage parts for R. A. F. bombers. A large rubber pad, 168 x 50 in., shown being assembled in the press, is recessed into the bottom of the upper press platen. This pad, which is 10⅞ in. thick and weighs 4000 lb., was made by the B. F. Goodrich Co. of specially compounded rubber with a tensile strength in excess of 4000 lb. per sq. in. and a 70 durometer hardness. A large number of steel or masonite dies are placed on the bolster plate. Press itself weighs 350 tons and is powered by two 150-hp. motors driving four radial piston type pressure generators. No valves are employed in the closed hydraulic system, the press ram being reversed by reversing the pump discharge.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Priorities to Be Renewed

Cleveland

• • • **Orders for the enlarged** aircraft, machine gun and anti-aircraft gun programs are beginning to come through in increased volume. New production sources for machine tools which are in heaviest demand are being set up steadily through both sub-contracts and complete new companies.

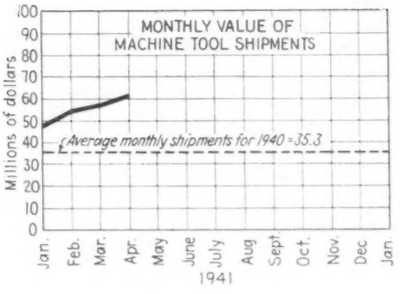
Priorities for machine tool builders (which are increasingly important) will be renewed as of June 30, but on a changed basis centering mostly on supplies. It is believed here that in order to obtain machine tools and cranes, builders will have to get separate priority for each item. Priorities have been always for a stated period. At the last general expiration they were renewed for the majority of the tool industry, but in some cases where companies held non-defense business as well as armament orders a gap existed before renewal which created some embarrassment until legal aspects were ironed out.

The amount of schedule shifting has lessened since Washington took over the direction of this phase. Most of the recent changes in schedules have sprung from the necessity of getting machines into production earlier than originally planned. At the same time, however, there have been occasional instances where machines rushed to completion and expedited in delivery have gone into storage while the purchaser awaited completion of new plant facilities.

Production Gains Assured

Cincinnati

• • • **The President's** proclamation of a general emergency occupied much of the attention of machine tool manufacturers in this area the past week, but no immediate effect was noted. That further production is the desire of the trade generally is a truism which must nevertheless yield to the practical limitations of plant and labor facilities. Steadily this year, increased



efficiency, enlarged plants and increasing labor supply from learner training courses have resulted in broader output and with further plant expansions now under way or completed, further gains are assured.

Currently, the machinery men are also taking an active part in the Miami Valley Industrial and Defense Exposition which opened on May 28 and will close on June 6. This affair is primarily a promotional exhibit for the defense program, but the machine tool men are presenting to the public the large role played by their products in the rearmament program. New business continues to flow in unceasing volume with British demand still high.

Used Machines Not Selling

Chicago

• • • **Setting price ceilings** on used machine tools didn't remove the headaches of the business by any means, according to dealers here. Their biggest complaint is that there still are good used machines in stock which are not being taken. Buyers prefer new machine tools, especially with the government's bankroll ready to finance such purchases. Consequently, one big dealer has had 81 late models sitting on his floor, ready for shipment for the past three weeks. Purchased by the British for use in American plants, this equipment remains unused because it has not been assigned. The same situation, in moderation, prevails among other dealers. Result is that dealers are not searching by-ways for more equipment.

One member of the trade feels that the government could earmark $5 to $10 million of the proposed $200,000,000 to be set aside for federal purchase of machine tools to purchase sound, used equipment. His proposal: let a government committee pick the best equipment from dealers throughout the country, then set up the equipment in warehouses in principal cities. When hurry-up defense calls come in, these machines could be sent quickly to the spots where needed most.

Orders are coming into new tool manufacturers increasingly again as producers get set to handle the heavier burden to be imposed by aircraft demands. Statement that the industry is turning out 1000 new machine tools per day meets with mixed reactions—most informed circles believe this figure includes the smallest tools such as hand tools. When it is considered that two leading milling machine manufacturers with more than half of the nation's capacity for this type of tool together do not turn out in excess of 1500 machines per month, the 1000 a day figure seemingly could not stand sharp analysis.

Navy Awards $22 Million Contracts for Bases

Washington

• • • **The Bureau of Yards** and Docks, Navy Department, on Monday awarded a supplemental agreement with George A. Fuller Co. and Merritt-Chapman & Scott Corporation, New York, for additional purchase and assembly of materials and equipment for advanced bases at St. Lucia, British Guiana, Jamaica, B. W. I., Antigua, B. W. I., and other advanced bases; and the construction of an Assembly and Shipping Depot in the vicinity of the Naval Air Station, Quonset Point, R. I. The total estimated cost, including fee, of this agreement is $22,800,000.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

Mandatory Priorities For Copper Set By OPM

New York, June 3—Defense officials moved rapidly last week to speed the flow of vital non-ferrous metals into war work. The long anticipated mandatory priorities for copper were established on May 31 by OPM and at the same time OPACS set up a formula for civilian allocation of such metal as may be left over after all defense needs have been met.

Two days previous to the copper order, a schedule of maximum prices for pure nickel scrap, monel, nickel steel, stainless steel and other scrap containing nickel was set up by OPACS.

In addition to the establishment of mandatory priorities for copper, the OPM announced it planned to organize a refined copper pool for June amounting to 20 per cent of April production to take care of emergency demands. This pool practice is similar to that established some time ago for zinc.

The order announcing priorities and civilian allocation was released simultaneously by the two agencies and apparently settled for the time being how the problem of civilian allocation would be handled.

OPM estimates that between 1,340,000 and 1,470,000 tons of refined copper, including substantial amounts of Chilean copper, will be available this year, and that total military and civilian requirements will approximate 1,810,000 short tons. The RFC is prepared to buy 500,000 tons of refined Chilean copper this year but whether Chilean refiners can meet this schedule and whether ships will be available is not certain.

Major points in the order subjecting copper to mandatory priorities control include: (1) An A-10 rating was assigned to all defense orders not bearing a higher preference rating. (2) A copper supplier can fill non-defense orders without requiring preference rating certificates from customers so long as this does not interfere with the requirements that defense orders be filled first. (3) Refiners, beginning June 1, shall set aside each month an amount of copper equal to 20 per cent of April production. This will be specifically allocated by the priorities division to meet emergency needs, the remaining copper to be pro-rated among customers. (4) Beginning June 1 all copper owned or thereafter acquired by the RFC's Metals Reserve Co. will be allocated by the priorities division. (5) An inventory control stipulation that customers' inventories must not be built up to excessive or unnecessary levels supersedes the blanket inventory control system issued on May 1, so far as copper is concerned.

Marketwise, there was little change in the major non-ferrous metals in the past week. Demand continues at a high rate and is restrained chiefly by restrictions imposed by sellers. Until the mandatory priorities for copper were set last week, no official controls were maintained by the Government over shipments. Mine producers of copper continue to quote 12c., Connecticut Valley, while smelters hold at 12c. Zinc is also unchanged at 7.25c., East St. Louis, and 7.65c., New York.

Lead shipments in May are estimated to have reached the peak of 90,000 tons, including 10,000 tons previously bought and paid for but held in reserve at the re-

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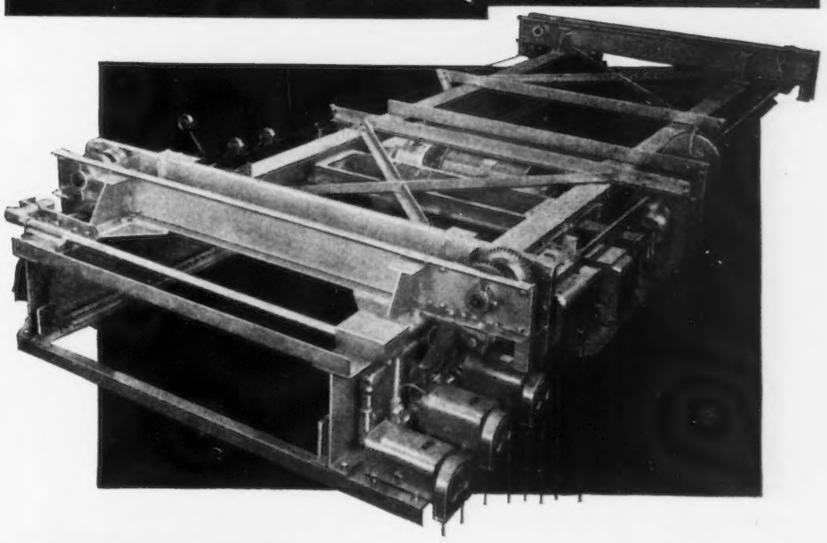

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fineries. Lead prices are unaltered at 5.70c., East St. Louis, and 5.85c., New York.

Tin demand was somewhat lighter last week, and premiums for spot metal narrowed as arrivals from the East bring in larger and larger quantities of tin. Prices were steady and firm, fluctuating with ⅛c. limits. General belief is that priorities for tin are unlikely for some time.

May Average Prices

Average prices of the major nonferrous metals in May, based on quotations appearing in THE IRON AGE, were as follows:

	Cents Per Lb.
Electro copper, Conn. Valley	12.00
Lake copper, East. delivery	12.00
Straits tin, spot, New York	52.177
Zinc, East St. Louis	7.25
Zinc, New York	7.65
Lead, St. Louis	5.70
Lead, New York	5.85

(*Non-ferrous prices on page* 145)

Republic's May Ingot Rate At Record High of 103.4%

Cleveland

• • • Republic Steel Corp. operated at 103.4 per cent of capacity during May, establishing new all time ingot production records at its Chicago, Cleveland, and Massillon open hearth plants. A new high was also established in the tonnage of electric furnace ingots produced at Canton, making a new total ingot production record for the central alloy district. All previous records were eclipsed on bar mills at Canton, Massillon, and Youngstown. At Chicago and Gadsden, Ala., total production of bars for the corporation as a whole likewise established a new high.

General Aniline Starts Iron Powder Production

• • • **General Aniline** Works has announced that they are now in production of Carbonyl iron powder at their works in Grasselli, N. J. The powders being produced in the new plant, the first of its kind in the United States, are destined principally for use in electrical devices.

Selling agent for these iron powders is Advance Solvents & Chemical Corp., 245 Fifth Avenue, New York.

OPACS Sets Nickel Scrap Price Ceiling

Washington

• • • **Price Administrator** Leon Henderson early this week fixed maximum prices for a wide range of scrap and secondary materials containing nickel and at the same time prescribed ceiling prices for the straight chrome type of stainless steel scrap and other types of stainless steel scrap.

Effective June 2, the price schedule covers pure nickel scrap, ferro-nickel-chrome-iron scrap, ferro-nickel-iron scrap, monel metal scrap, cupro-nickel alloy scrap, stainless steel scrap, nickel steel scrap, secondary monel metal ingot, secondary monel metal shot, and secondary copper-nickel shot. OPACS explained that the maximum prices for nickel steel scrap are tied to the prices fixed for iron and steel scrap in the price schedule of April 2.

A grade of steel scrap containing less than 1 per cent nickel may not be sold at more than the maximum price for a like grade of steel scrap fixed under the April 2 order. The maximum price for a grade of steel scrap which contains 1 per cent or more nickel is the maximum price for a like grade of steel scrap fixed in the scrap iron and steel price schedule, plus $1 per gross ton for each ¼ of 1 per cent of nickel content. A Broker's commission of 5 per cent is allowed on sales of stainless steel scrap, and 2 per cent on nickel steel scrap.

A premium is allowed any seller of scrap, described in the order as a "converter," who performs prescribed functions. Also established are quantity differentials entitling any seller of scrap, whether converter or not, to a premium for shipments of the specified quantity or more of material at one time.

A converter, OPACS explained, may be entitled to both the converter's premium and the quantity premium. Sellers who are not converters may nevertheless be entitled to the quantity premium.

OPACS made public this example indicating a method of computing maximum prices: The basic maximum price established for a pound of Inconel, containing 80 per cent nickel, 14 per cent chrome, and 6 per cent iron, is 26½c a lb. of nickel contained; 8c per lb. of chrome contained, and no payment for the iron.

"The basic maximum price established for a lb. of Inconel, containing 80 per cent nickel, 14 per cent chrome, and 6 per cent iron, is 26½c per lb. of nickel contained; 8c per lb. of chrome contained, and no payment for the iron. The basic maximum price is thus 22.32c per lb., including a quantity premium of ½c. A converter, shipping 10,000 lb. or more may receive 24.32c per lb., including a converter's premium of 1½c per lb. A converter shipping less than 10,000 lb. may receive 23.82c per lb."

Scrap, Secondary Aluminum Price Schedule Amended

Washington

• • • **Made immediately** effective, further amendments to the price schedule for aluminum scrap and secondary aluminum ingots were announced on Tuesday by Price Administrator Henderson.

Principal changes include: (1) Special secondary aluminum alloys have been removed from that part of the schedule relating to secondary aluminum ingot. (2) Price regulation has also been removed from aluminum scrap of designated grades produced by the aircraft industry, segregated as to alloy, and returned to the supplier of the original material for reconversion into similar material in accordance with instructions of the director of priorities. (3) Quantity differentials for aluminum scrap have been removed but such differentials continue on secondary aluminum ingot sold in less than 30,000 lb. lots. (4) A special note has been added removing from the schedule aluminum foil and light gage sheet which does not exceed 0.006 in. in thickness.

Find Nickel in Alaska

• • • **Calculations** based on investigations of nickel deposits of Bohemia basin and its vicinity, on Yakobi Island, Alaska, made by the United States Geological Survey, indicate about 6,000,000 tons of rock containing about 0.36 per cent nickel and 0.27 per cent copper is present and available for mining in eight sulfide-bearing rock bodies that have been partly prospected.

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

While the passage of time has seen some of the confusion surrounding the price ceilings subside and an accompanying slight improvement in the flow of scrap, the movement in most districts is still substantially below the current rate of consumption.

Despite numerous efforts to obtain clarification on the matter of interpreting certain sections of the May 7 order, no official clarification has yet been issued. This is described by some sources as the most urgent need of the moment. While some large brokers and users have access to Washington for explanations, many smaller interests are still in the dark and are clamoring for official interpretations of certain grade and district differential problems.

Numerous unofficial interpretations are circulating through the market, leaving many users and small dealers in a quandary as to how to proceed. In the absence of an authoritative statement from Washington on these questions, some of the smaller interests are becoming more confused now than when the price ceilings were first promulgated.

From a supply view point, chief immediate problem is how to draw out remote and marginal supplies necessary to sustain the present high rate of steel operations. The manner of encouraging small collectors to continue in their efforts is another big problem facing the industry. Collections from this latter source have dropped sharply over recent weeks, chief reliance now being on industrial material.

While spotty tightness in scrap supplies have developed at several plants, no cessation of steel making due to lack of scrap has yet come to light. When such tightness has developed, dealers have concentrated upon building up supplies at the plant involved, reducing shipments to other mills. How long this method will suffice is questionable and is causing considerable concern to both consumers and dealers.

THE IRON AGE scrap composite remains unchanged at $19.17.

The government schedule of maximum prices of iron and steel scrap was published in the May 15 issue of THE IRON AGE and is not repeated this week. The prices will be reprinted in the event of any changes in the schedule.

Pittsburgh

Transactions continue in a relatively restricted manner, the bulk of business involving local or near-local material. Brokers are not going short as a rule and are selling only what they are able to obtain. Dealers' scrap supplies are affected to some extent by the small gatherers in many instances drifting into other jobs where the pay is higher. This latter condition is also affecting supplies coming from the Southwest and South and may ultimately in the aggregate bring about a severe shortage in scrap.

Chicago

Scarcity of motor blocks here has foundries crying for scrap. Several reasons are advanced—one that the price here is $3 too low; another that truckers are coming into Chicago, loading the cast themselves and trucking it to Michigan and Indiana and surrounding territories. Brokers generally are handling less volume than formerly, selling tonnages only equivalent to what they can buy. Bulk of railroad scrap is still held by its owners.

Philadelphia

Some No. 2 selected bundles have been sold recently to district mills at $17.75, the same price as for No. 2 heavy melting steel and $1 over the maximum established for No. 2 bundles in the May 7 price order. It is reported that these bundles consisted of selected material and are considered better than ordinary No. 2 bundles. It is also said that these selected bundles in the past have always commanded a premium over ordinary bundles. While no formal statement on this situation has been made by Washington, it is understood that interpreting the price order to permit sale of No. 2 selected bundles on a par with No. 2 melting steel has the tentative approval of price officials.

Youngstown

New York Central was scheduled to sell its scrap on June 5, but amount available was below expectations. Baltimore & Ohio list, which closed June 2, contained around 3300 tons of heavy melting steel and 1500 tons of rerolling rails. The Pennsylvania list was scheduled to close June 4, offering about 3000 tons of heavy melting.

Cleveland

An unprecedented clamor for railroad scrap is apparent here. Pressure for quick delivery often is felt by the carriers who have found it difficult to load and move work trains in the face of a greatly enlarged movement of freight for the defense program. Railroads are being hampered by the fact that they cannot lift old rails until new rails are received from the mills and apparently track on order is not coming through as quickly as expected.

Buffalo

Market here is quiet although the number of sales for one and two carload lots has noticeably increased in the last two weeks while larger sales have noticeably decreased. Scrap trading has dropped off considerably, the flow of scrap is retarded and yard supplies, generally, are somewhat below normal. Due to high labor costs, dealers are throwing the cheaper low phos scrap in with No. 1 heavy melting steel. Heavy plate low phos, commanding a higher price, is being prepared as usual.

St. Louis

Dealers complain that scrap from the Southwest which ordinarily comes to this market is being diverted to Peoria, which has a lower freight rate and a higher scrap basing point price. Little scrap is coming in from nearby points, as farmers are inactive in gathering material. Mills will buy all scrap offered, but dealers refuse to book any large tonnages, preferring to sell as they get it.

Cincinnati

Recent conferences in Washington had brought forth promises of relief to this area, particularly on steel and stove plate which were badly out of line, but so far no formal announcement has been made. General effect of the regulations has been to restrict business almost to a standstill, with particular emphasis upon those items which are so out of line, that dealers in this area cannot attract material for their customers.

Detroit

Lists of scrap offered by plants here for June followed approximately the pattern established a month ago. Bids invariably offered the maximum permitted by government scrap regulations except in isolated cases where a differential on the low side has been common. It is understood that tonnages were split up among brokers in many instances giving each bidder a share.

Boston

Scrap is coming out in small lots here which gives the impression it is scarce. Indications are, however, it is not as scarce as it appears; that the many uncertainties hanging over the market account in a large measure for the tight supply situation. Shipments to mills are very largely confined to steel turnings and busheling material.

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings decline to 11,100 tons from 27,450 tons last week; new projects higher at 27,300 tons; plate awards call for 1580 tons.

AWARDS

NORTH ATLANTIC STATES

2200 Tons, Pittsfield, Mass., General Electric Co. plant, to American Bridge Co., Pittsburgh through Stone & Webster Engineering Corp., Inc., Boston.

1600 Tons, North Creek, N. Y., National Lead concentrating plant, to Belmont Iron Works, Philadelphia.

600 Tons, Middleton, Pa., engine storage warehouse, Army Air Corps, to Pittsburgh Bridge & Iron Works, Pittsburgh.

560 Tons, Trafford, Pa., foundry addition for Westinghouse Electric & Mfg. Co., to Ingalls Iron Works Co., Birmingham.

545 Tons, Hartford, Conn., State bridges, Wawarme and Van Dyke Avenues, to Bethlehem Steel Co., Bethlehem, Pa.

315 Tons, Wethersfield, Conn., Folly Brook Boulevard, bridges, to Harris Structural Steel Co., Plainfield, N. J.

295 Tons, Coatesville, Pa., soaking pits for Lukens Steel Co., to Belmont Iron Works, Philadelphia.

250 Tons, Centre County, Pa., State highway bridge, to Phoenix Bridge Co., Phoenixville, Pa.

210 Tons, Schenectady, N. Y., building addition for New York Telephone Co., to American Bridge Co., Pittsburgh.

185 Tons, Hoboken, N. J., Sweets Co. of America building, to an unnamed bidder.

180 Tons, Eightyfour, Pa., State bridge over Baltimore & Ohio Railroad, to American Bridge Co., Pittsburgh.

150 Tons, Columbia County, Pa., State highway bridge, to Fort Pitt Bridge Works Co.

100 Tons, Fort Ethan Allen, Vt., ordnance building to an unnamed fabricator, through Coleman Construction Co., Providence, R. I., contractor.

THE SOUTH

1500 Tons, Louisville, Ky., neoprene plant, E. I. du Pont de Nemours & Co., to Virginia Bridge Co., Roancke, Va.

250 Tons, Corpus Christi, Tex., land plane hangars at naval air station, to Austin Brothers, Dallas, Tex.

CENTRAL STATES

600 Tons, Ravenna, Ohio, steel dunnage racks for ordnance plant, to Ingalls Iron Works Co., Birmingham.

459 Tons, Decatur, Ill., State bridge to Joseph T. Ryerson & Son, Inc., Chicago.

330 Tons, Franklin Furnace, Ohio, Scioto County bridge, to Fort Pitt Bridge Works Co., Pittsburgh.

303 Tons, Farmland, Ind., bridge, to Pan-American Bridge Co., New Castle, Pa.

WESTERN STATES

423 Tons, Big Horn, Mont., County bridge, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

11,000 Tons, Brooklyn, tremie trusses, dry docks Nos. 5 and 6 for Navy.

900 Tons, New York, bent section and plaza, for Lincoln Tunnel.

560 Tons, Middleton, Pa., airplane engine repair shop, Army Air Corps.

500 Tons, Bayonne, N. J., addition to transit shed for Navy.

425 Tons, Nutley, N. J., three buildings, for Hoffman-La Roche, Inc.

350 Tons, Mount Lebanon, Pa., high school bleacher stands.

300 Tons, Washington, underpass on Main Avenue.

275 Tons, Philadelphia, bridge crane girders for Navy.

250 Tons, Buffalo, American Car & Foundry Co., plant addition.

225 Tons, Emsworth, Pa., lock and dam, Ohio River, lock wall armor for U. S. Engineers' Office.

200 Tons, Niagara Falls, N. Y., plant expansion for B. F. Goodrich Rubber Co.

200 Tons, Peterboro, N. H., State bridge.

200 Tons, Orono, Me., University of Maine library.

190 Tons, Middletown, Pa., airfield equipment building.

150 Tons, Pedricktown, N. J., warehouse, Army Ordnance Department.

135 Tons, Pittsburgh, repairs to bridges for Pennsylvania Railroad.

130 Tons, Morris County, N. J., State highway bridge, route 6, section 21A, bids June 6.

100 Tons, Swedesboro, N. J., bridge, highway project, FAP, FAS 47-A; bids June 13; readvertisement.

100 Tons, Fairview, N. J., overpass, highway project, FAP, SN-FAGM 144-B; bids June 13; readvertisement.

100 Tons, Sutton, Mass., State bridge.

SOUTH AND SOUTHWEST

1500 Tons, Memphis, Tenn., bomber plant; bids taken June 4.

1000 Tons, Phoenix, Ariz., plant for Goodyear Tire & Rubber Co. in preliminary stage.

600 Tons, Warren County, Ky., Barren River State bridge.

125 Tons, Alexandria, Va., building addition for Chesapeake & Potomac Telephone Co.

CENTRAL STATES

5500 Tons, Peoria, Ill., State bridge route FA-172, section 15, E and F.

450 Tons, Kenosha, Wis., buildings for American Brass Co.

250 Tons, St. Louis, flash roaster building for National Lead Co.

150 Tons, Dubuque, Iowa, power house addition for Interstate Power Co.

WESTERN STATES

877 Tons, Los Angeles, State bridge across Los Angeles River and railroad crossing; bids taken.

550 Tons, Ogden, Utah, Utah General Depot buildings; James I. Barnes Construction Co., Santa Monica, Cal., low bidder.

FABRICATED PLATES

AWARDS

1406 Tons, Quonset Point, R. I., pontoons, to an unnamed fabricator, through George A. Fuller Co. and Merritt, Chapman & Scott.

175 Tons, Arlington, Mass., State water tower, to Bethlehem Steel Co., Bethlehem, Pa.

Reinforcing Steel

Awards of 8,300 tons; 1,400 tons in new projects.

AWARDS

ATLANTIC STATES

1767 Tons, Roxbury, Mass., Orchard Park housing project, to Truscon Steel Co., Youngstown; through M. S. Kelliher Co., Inc.

1200 Tons, Brooklyn, Long Island Railroad subway, contract No. 6, to Jones & Laughlin Steel Corp., Pittsburgh; Tully & DiNapoli, contractors.

300 Tons, Philadelphia, defense housing project, to Bethlehem Steel Co., Bethlehem, Pa., through Fireproof Products Co.; H. R. H. Construction Co., contractor.

300 Tons, Philadelphia, defense housing, to Jones & Laughlin Steel Corp., Pittsburgh, through Fireproof Products Co.; Concrete Arch Contracting Co.

295 Tons, Hartford County, Conn., bars and mesh for viaduct and bridges, to Concrete Steel Co., Boston.

185 Tons, Union, Conn., highway mesh, to American Steel & Wire Co., Worcester, Mass., through Onegla & Gervasini, Inc., Torrington, Conn., contractor.

175 Tons, Cheektowaga, N. Y., disposal plant No. 5, to Buffalo Steel Co., North Tonawanda, N. Y.; through C. E. Knowles, Gowanda, N. Y.

152 Tons, Chester, Pa., building for Scott Paper Co., to Truscon Steel Co., Youngstown, through David M. Hunt, Chester, Pa.

150 Tons, Merion, Pa., Mayfair Co. apartment building, to Truscon Steel Co., Youngstown.

SOUTH AND CENTRAL

1800 Tons, Cincinnati, Lincoln Court housing project, to Pollak Steel Co., Cincinnati; H. M. Boyajohn, contractor.

Weekly Bookings of Construction Steel

Week Ended ——→	June 3, 1941	May 27, 1941	May 6, 1941	June 4, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	11,100	27,450	49,925	16,600	685,960	318,280
Fabricated plate awards	1,580	590	0	5,005	69,735	64,130
Steel sheet piling awards	0	0	665	0	16,755	16,440
Reinforcing bar awards	8,300	13,110	8,410	9,450	287,700	177,700
Total Letting of Construction Steel	20,980	41,150	59,000	31,055	1,060,150	576,550

188 Tons, Ashland, Ky., American Rolling Mill Co., to Truscon Steel Co., Youngstown, through Arthur G. McKee Co., Cleveland.

146 Tons, St. Paul, Minn., Swift & Co. sausage plant, to Truscon Steel Co., Youngstown, through Paul Steenberg Construction Co.

140 Tons, Cincinnati, Little Miami interceptor sewer, to Pollak Steel Co., Cincinnati; Nolan Construction Co., contractor.

120 Tons, Chicago, Santa Fe Railroad yard repairs, to Truscon Steel Co., Youngstown.

105 Tons, Newport News, Va., Masonic building, to Truscon Steel Co., Youngstown, through Virginia Engineer Co. and Wise Contracting Co., Norfolk, Va.

100 Tons, Mobile, Ala., Chickasaw steam plant for Alabama Power Co., to Truscon Steel Co., Youngstown.

100 Tons, Richmond, Va., Miller & Rhoads warehouse and garage, to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.; Doyle & Russell, contractor.

WESTERN STATES

415 Tons, Santa Monica, Cal., St. John's Hospital, to Blue Diamond Corp., Los Angeles, through Pozzo Construction Co., Los Angeles, contractor.

125 Tons, Portland, Ore., addition to gas plant, to Truscon Steel Co., Youngstown, through Reimers & Jalivette, Portland.

100 Tons, San Rafael, Cal., department store building, to Truscon Steel Co., Youngstown, through Leibert & Trabock.

PORTO RICO

400 Tons, San Juan, Porto Rico, air base, partial requirements, Borinquen Field, to Capitol Steel Corp. of New York; McCloskey & Co., contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1800 Tons, East Aurora, N. Y., route No. 16 highway project; Holmes & Murphy, Orchard Park, N. Y., general contractors.

SOUTH AND CENTRAL

247 Tons, Warren County, Ky., Barren River bridge; bids June 6.

180 Tons, Charleston, Ind., two government warehouses.

146 Tons, Norton, W. Va., bridge No. 1452; bids taken.

WESTERN STATES

352 Tons, Los Angeles, State bridge across Los Angeles River and railroad overcrossing; bids June 26.

260 Tons, Oakland, Cal., Lockwood Gardens housing project; James I. Barnes Construction Co., Santa Monica, Cal., low bidder.

200 Tons, San Francisco, United States Engineer (Invitation 868-41-214); bids in.

Cast Iron Pipe

Poplar, Wis., plans about 7500 ft. of 4 and 6-in. pipe for water system; also pumping machinery and other waterworks installation. Special election is being arranged to vote bonds for $18,000. Cost about $50,000, remainder of fund to be secured through Federal aid. Leo W. Peleske, Columbia Building, Superior, Wis., is consulting engineer.

Ada, Ohio, plans pipe line extensions and replacements in water system. Estimates of cost are being made. Champe, Finkbeiner & Associates, Nicholas Building, Toledo, Ohio, are consulting engineers.

West Frankfort, Ill., plans about seven miles of 8-in. pipe for main water supply to municipality from new water source now being developed.

Lock Haven, Pa., plans pipe line extensions in water system in parts of Castanea Township, for supply to neighboring communities.

Public Water Supply District No. 3, St. Louis County, Clayton, Mo., care of Robert Francis Denny Co., 8004 Bonhomme Street, Clayton, consulting engineer, has arranged fund of $348,777 for pipe lines for water system in southern part of county, in area bounded by Mississippi River on east and Meramec River on south. Of amount noted, $110,000 will be represented by bond issue and remainder of fund through Federal aid.

Moxee City, Wash., plans pipe lines for water system and other waterworks installation, including elevated steel tank and tower. Cost about $35,000. G. D. Hall, Larson Building, Yakima, Wash., is consulting engineer.

Jacksonville, Tex., plans pipe line extensions and improvements in water system, and other waterworks installation. Bond issue of $75,000 has been authorized. H. L. Thackwell, 209 East Cotton Street, Longview, Tex., is consulting engineer.

Pipe Lines

Panhandle Eastern Pipe Line Co., 101 West Eleventh Street, Kansas City, Mo., plans new welded steel pipe lines for natural gas transmission in Michigan, extending from present terminus of main system from Texas Panhandle district to vicinity of Detroit, to points in central and western Michigan, where service will be furnished to Consumers Power Co., Jackson, Mich., for distribution in several municipalities now using artificial gas, including Jackson, Kalamazoo, Mount Clemens, Flint, Birmingham and other communities, totaling 65 in all. Consumers company also will build connecting welded steel pipe lines for service to new control stations at different distribution points. Cost estimated at $11,000,000, of which $9,000,000 will be expended by Panhandle company for main lines, booster stations and other operating facilities; remainder of $2,000,000 will be used by Consumers company for work noted. Latter company has contracted with Panhandle company for natural gas supply and Michigan Public Service Commission will begin hearings on project June 10. Consumers company is completing construction of new welded steel pipe line from new gas field in Clare, Osceola and Missaukee Counties, Mich., extending from point near Midland to terminal in vicinity of Cadillac, about 60 miles, for natural gas transmission for distribution in Saginaw Valley area.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until June 9 for 7000 ft. of uncoated welded black steel pipe, and 2000 ft. of galvanized zinc-coated welded steel pipe (Circular 2399).

New York State Electric & Gas Corp., Ithaca, N. Y., plans pressure pipe line from Geneva to Auburn, N. Y., about 30 miles, for natural gas transmission for distribution at latter place.

Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, has awarded contract to Jones & Brooks, Inc., Oklahoma City, for new 6-in. welded steel pipe line from Bronson, near Sioux City, Iowa, to Sioux Falls, S. D., about 86 miles, for gasoline transmission. Bulk terminal will be built at latter place on 40-acre tract, initial installation to comprise large pumping station, nine steel tanks and accessory facilities. New line will form an extension of pipe line system from Council Bluffs, Iowa, to Bronson, about 81 miles, on which construction is in progress. An existing pipe line connects Council Bluffs with company oil refinery at Sugar Creek, near Kansas City, Mo.

Rio Grande Valley Gas Co., 455 Elizabeth Street, Brownsville, Tex., J. C. Jordan, vice-president, has approved plans for pressure pipe lines for natural gas distribution at Harlingen, Tex., using cast iron, welded-joint pipe.

United States Engineer Office, Savannah, Ga., asks bids until June 11 for pressure pipe lines for gasoline fueling system at Augusta air base, Augusta, Ga., including storage tanks and auxiliary equipment (Circular 143).

United States Engineer Office, Post Office and Court House Building, Baltimore, will receive bids (no closing date stated) for pressure pipe lines for air corps fueling system at Olmsted Field air depot, Middletown, Pa., including truck sill stand and accessories.

San Francisco will take bids June 17 for a pipe line and two steel water tanks for the Sunol Irrigation and Domestic Water Systems near Sunol, Cal. Project comprises two steel tanks, approximately 12,200 ft. of steel pipe and 14,500 lb. of steel pipe and specials.

May Pig Iron Output at 93.8% of Capacity

• • • **Production of** coke pig iron in May totaled 4,599,966 net tons, compared with 4,334,267 tons in April. On a daily basis, output in May rose 2.7 per cent from that in April, or from 144,475 tons a day to 148,386 tons in May. The industry operated at 93.8 per cent of capacity, against 91.8 per cent in April.

There were 205 furnaces in blast on June 1, 10 more than on May 1. United States Steel Corp. blew in seven units, independent producers blew in two and took two off blast, and three merchant units were blown in. (*Complete tabulations will be published in the June 12 issue of* THE IRON AGE.)

Pittsburgh Trucking Strike Hampers Defense Shipments

Pittsburgh

• • • **A major trucking strike** here has held up the shipment of vital defense needs, disrupted some commercial steel deliveries, and has added general confusion to the transportation system in this industrial area.

Some relief was afforded Tuesday of this week on defense materials when the government demanded that all products involved in or needed for defense work were to be transported. Further relief resulted when about 100 independent truckers signed contracts with the AFL Teamsters' union. The dispute arose over demand for increased wages.

Transportation Unit Formed By Henderson

Washington

• • • **Creation of** a Transportation Unit in the Office of Price Administration and Civilian Supply has been announced by Leon Henderson, Administrator. Heading the unit will be Dr. Lloyd Wilson, University of Pennsylvania economist, assisted by John H. Eisenhart, attorney, and John Simpson, rate expert. Both Mr. Eisenhart and Mr. Simpson were formerly with the Maritime and Interstate Commerce Commissions.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extas, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ([10])			
TERNES, MFG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only. 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pitsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	65½
9/16 and ⅝ in. by 6 in. and shorter	63½
¾ to 1 in. by 6 in. and shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65
Nuts, cold punched or hot pressed, hex. or square:	
½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pitsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *Per Cent Off List*

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap screws, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	May 28	May 29	May 31	June 2	June 3
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	52.25	52.125	....	52.125	52.25
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	52.75	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	91.0
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt, 98-99%	18.00	18.50
Solder		
½ and ½	32.00	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.75	11.375
Hvy. and wire	9.75	10.25
Light and bottoms	8.75	9.25
Brass		
Heavy	6.25	6.75
Light	5.25	6.00
No. 1 yel. turn	6.00	6.50
No. 1 red or compo. turnings	9.50	10.50
Hvy. Mach. compo.	9.75	10.00
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11.00	12.00
Sheet	12.00	13.50
Zinc	....	5.10

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $180-$182. per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade .....2.70c.
Delivered, Detroit .....2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

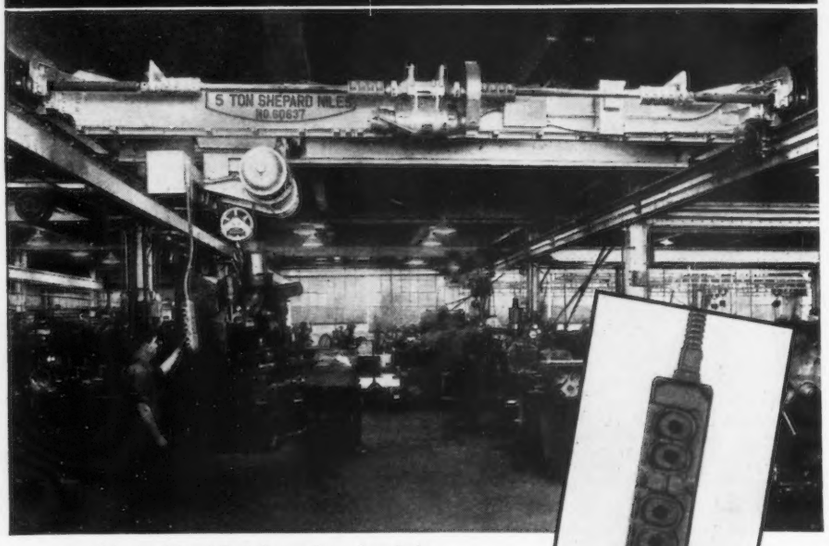
Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

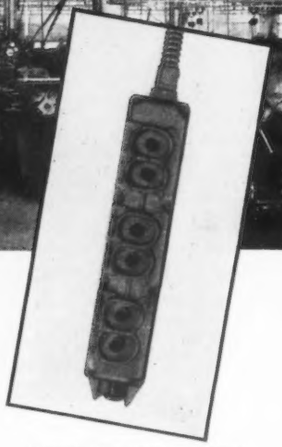
Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade .....3.50c.

OVERHEAD
Electric Traveling Cranes
CAPACITIES 1 TO 450 TONS



Selective 5-Speed Push Button Control applied to a Shepard Niles Inner-Running Trolley Crane.



Shepard Niles Selective 5-Speed Master Switch.

● Up under the ceiling there is always a clear right of way for moving loads. Floor space is saved—aisles are never blocked—and materials move faster, move most economically on the crane or hoist precisely suited to the job.

Shepard Niles offers Electric Cranes of practically every type for lifting and moving loads up to 450 tons and Electric Hoists of more than 5000 standard types and sizes.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

356 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37,35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

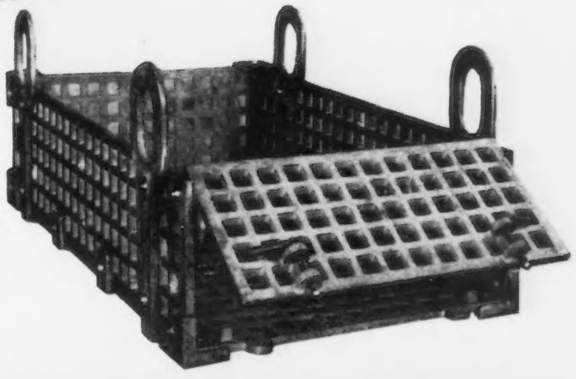
F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Prolong
PICKLING BASKET LIFE

Revolving Basket for Hollow Ware

These Super or Stainless B & M Metal Pickling Baskets are first choice of those who pickle hollow ware and heavy forgings.

Built strong-simple-and preserve full strength over long periods. Write today for complete specifications.



For Heavy Forgings Open End Type

WHEELING BRONZE CASTING CO.

WHEELING, W. VA.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Grosss Ton
Old range, bessemer, 51.50%..	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

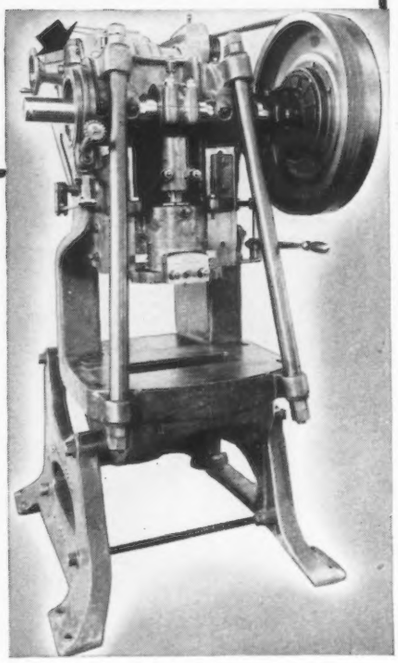
C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
African, Indian, 44 to 48% Mn.	57c. to 61c.
African, Indian, 49 to 51% Mn.	60c. to 65c.
Brazilian, 46 to 48% Mn...	54c. to 59c.
Cuban, del'd, duty free, 51% Mn.	67½c. to 71c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered....	$23 to $24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton; South African (low grade).....	Nom.
Rhodesian, 45%	$25.00
Rhodesian, 48% ...	$28.00 to $30.00

Variable Speed Control

—Now a "MUST" on Most New Machines



American industry has become speed control conscious. The advantages of being able to operate at exactly the right speed for each job, under all conditions, are so obvious that provision for some form of speed regulation is being made in the plans for most new machines that are coming off the drafting boards of machine manufacturers. Leading all other speed control methods as standard equipment, REEVES Variable Speed Control units are so versatile and varied in size and capacity as to make the correct installation an extremely simple matter.

Shown above, is a new high speed press of the inclinable type, now being offered by the V. & O. Press Co., Hudson, N. Y. This press has a capacity of 55 tons and is capable of operating at speeds up to 300 strokes per minute. It is fitted with a hand-operated cone type clutch and fully releasable brake, enabling the operator to stop the machine at any point of the stroke. Equipped with a REEVES Vari-Speed Motodrive, the machine can be operated at the best speed for each type of die, and kind of metal. Similar REEVES units are available for metal working machines of all types now in service. Write for new, "speed up" book containing 36 specific examples.

REEVES PULLEY COMPANY, *Dept. I*, COLUMBUS, INDIANA

REEVES SPEED CONTROL

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines....	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick at St. Louis..	$60.80
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey.....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois	42.75
Second quality, New Jersey....	9.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton.....	7.10

Silica Brick

Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	

Magnesite Brick

Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks.....	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed)..... 87.00*
75% (carload, lots, bulk)....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24% per gross ton, $3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo., f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.90c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.75c.
No. 4 indus., del'd Cleveland...5.375c.
No. 5 indus., del'd Cleveland...5.125c.
No. 6 indus., del'd Cleveland...4.875c.

METAL SPHERES
WITH
LAPPED SURFACES

Strom Steel Balls possess that extra measure of quality by means of which the ultimate in ball bearing performance is achieved.

This special lapping practice is exclusive with Strom.

Physical soundness — correct hardness — size accuracy and sphericity are guaranteed in all Strom Balls.

Other types of balls — STAINLESS STEEL —MONEL—BRASS & BRONZE—are also available in all standard sizes. Write for full details.

Strom STEEL BALL CO.
1850 So. 54th Avenue, Cicero, Ill.
The largest independent and exclusive Metal Ball Manufacturer

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$6.00 to $6.25

Foundry, f.o.b. Connellsville, prompt .....$6.75 to $7.00

F'dry, by-product, Chicago..... 10.50

F'dry, by-Product, New England 13.75

Foundry, by-product, Newark or Jersey City .....$12.45 to 12.95

F'dry, by-product, Philadelphia. 12.13

F'dry, by-product, Cleveland... 12.30

F'dry, by-product, Cincinnati... 11.75

Foundry, Birmingham 8.50

F'dry, by-product, St. Louis $10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth..£16 10s.

Beams, open hearth....£19 10s.

Channels, open hearth...£19 10s.

Angles, open hearth....£15 10s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	.....
Brooklyn	***27.50***	.....	.....	***28.00***	.....
Jersey City	***26.53***	***26.03***	***27.53***	***27.03***	.....
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	29.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	.....
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	.....
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	.....
St. Louis	***24.50***	***24.02***	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	***26.63***	.....	***27.13***	***26.63***	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	20.38	19.00	25.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....$23.50

CHARCOAL

Lake Superior fce.....$28.00
Delivered Chicago 31.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.15
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	9.55
Bars ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	10.55
Bars cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.55

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions; Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lbs.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga., 1 to 6 bundles. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43.

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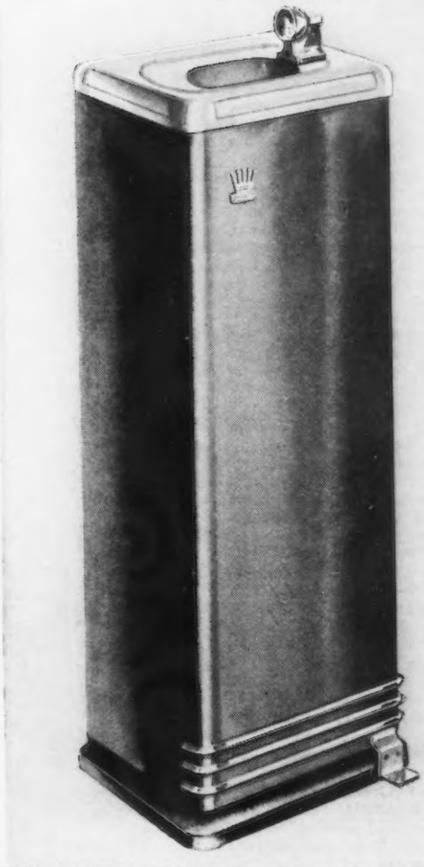

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(IA-6)

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **American Insulated Wire Corp.,** 610 Manton Avenue, Providence, R. I., electric wires, etc., plans one-story addition, 75 x 80 ft. Cost close to $50,000 with equipment. Barker & Turoff, Grosvenor Building, are architects.

United Aircraft Corp., Vought-Sikorsky Division, Stratford, Conn., is erecting one-story addition for expansion in tool department, for which general contract recently was let to E. & F. Construction Co., 94 Wells Street, Bridgeport, Conn. Cost close to $75,000 with equipment. This is part of expansion program in progress at this plant.

High Standard Mfg. Co., Inc., New Haven, Conn., automatic pistols, drills, etc., plans new plant at Hamden, Conn., for parts production and assembling of machine guns for Government, which will provide fund of $4,300,000 through Defense Plant Corp., Washington, Federal agency.

Fitchburg Grinding Machine Corp., Fitchburg, Mass., grinding tools, etc., has let general contract to B. A. Stephens Co., Fitchburg, for one-story addition. Cost close to $55,000 with equipment.

Board of Trustees, Worcester Polytechnic Institute, Worcester, Mass., has let general contract to R. L. Whipple Co., 44 Portland Street, for three-story mechanical engineering building, 120 x 208 ft. Cost about $350,000 with equipment. Appleton & Stearns, 53 State Street, Boston, are architects.

United States Engineer Office, Park Square Building, Boston, asks bids until June 12 for pumping machinery and auxiliary equipment for station at Lowell, Mass. (Circular 99).

Goodyear Rubber Co., Middletown, Conn., plans two or three-story addition, now being determined, for expansion. Cost about $100,000 with equipment. Towner & Lamb, 164 Court Street, are architects.

Public Works Officer, Navy Yard, Portsmouth, N. H., asks bids (no closing date stated) for 1500-kw. motor-generator set, switchgear and accessories for local yard (Specification 10430).

Sperry Gyroscope Co., Inc., 40 Flatbush Avenue Extension, Brooklyn, precision instruments and parts, has let general contract to Thompson-Starrett Co., 444 Madison Avenue, New York, for two-story plant, 100 x 208 ft., at 22-52 Chapel Street. Cost over $150,000 with equipment. George A. Boehm, 2 West Forty-fifth Street, New York, is architect.

General Electric Co., Schenectady, N. Y., plans one-story addition, 240 x 360 ft., for expansion in steam turbine-manufacturing division. Cost close to $400,000 with equipment. Charles T. Main, Inc., 201 Devonshire Street, Boston, is architect and engineer.

Farrand Optical Co., Inc., 35 West Forty-fifth Street, New York, precision optical instruments, has purchased four-story building, 50 x 200 ft., at Nereid Avenue and Bronx Boulevard, Bronx, totaling 40,000 sq. ft., for new plant.

Ranger Aircraft Engine Division, Fairchild Engine & Airplane Corp., Farmingdale, L. I., has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, New York, for one and two-story addition, to double production facilities in parts and assembling departments. Cost about $1,475,000 with equipment.

Continental Can Co., 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for one-story addition to plant on West Sixty-fifth Street, Chicago, about 100 x 225 ft. Cost over $150,000 with equipment.

Linde Air Products Co., Inc., East Park Drive and Woodward Avenue, Tonawanda, N. Y., has let general contract to John W. Cowper Co., Buffalo, for one-story addition. Cost close to $250,000 with equipment. Company is a subsidiary of Union Carbide & Carbon Corp., New York. Latter company, in cooperation with African Metals Corp., 25 Broadway, New York, has work under way on addition to plant on Forty-seventh Street, Niagara Falls, N. Y., for a cobalt refining unit, raw material to be secured from Africa through last noted company, which has provided fund of about $600,000 for plant.

United States Engineer Office, Security Mutual Building, Binghamton, N. Y., asks bids until June 10 for new pumping plant at Cutler Creek Station, Corning, N. Y.

Allegany Refiners, Inc., Bolivar, N. Y., has approved plans for expansion and improvements in oil refinery, including additional equipment. Cost about $75,000 with equipment.

Bliss & Laughlin, Inc., 110 Hopkins Street, Buffalo, shafting and other steel products, plans one-story addition. Cost over $60,000 with equipment.

Bendix Aviation Corp., Magnesium Foundry Division, Bendix, Hasbrouck Heights, N. J., plans new plant for production for Government, consisting of main one-story foundry and adjoining structures. Cost about $1,079,000, of which about $440,170 will represent land and buildings, and $638,830 will be expended for equipment. Fund in amount noted will be furnished by Defense Plant Corp., Washington.

Quimby Pump Co., Inc., 340 Thomas Street, Newark, N. J., pumping machinery and parts, has let general contract to James F. Mitchell, Inc., 40 Clinton Street, for new one-story plant at New Brunswick, N. J. Cost close to $70,000 with equipment.

L. S. Brach Mfg. Corp., 55 Dickerson Street, Newark, electrical and radio equipment, lightning arrestors, etc., has leased about 25,000 sq. ft. in building at 116-32 Sussex Avenue for expansion. Present plant will be continued as heretofore.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until June 9 for drill chucks (Circular 2395), flexible steel wire (Circular 2396).

Moser Jewel Co., 367 Division Street, Perth Amboy, N. J., jewel bearings for precision apparatus, has approved plans for two-story and basement plant, 85 x 180 ft., on Fayette Street, for production of equipment for Government. Cost over $65,000 with machinery. M. G. Tuzik, 214 Smith Street, is architect.

Fleetwings, Inc., Bristol, Pa., is asking bids for new plant, about two miles from present aircraft-manufacturing works, for production for Government. It will be one-story, about 170,000 sq. ft. floor space, primarily for assembling, with present plant used for fabricating and parts divisions. Company has arranged for fund of $2,484,000 through Defense Plant Corp., Washington, for project. Giffels & Vallet, Inc., Marquette Building, Detroit, is architect and engineer.

United States Engineer Office, Post Office and Court House Building, Baltimore, asks bids (no closing date stated) for one-story aircraft engine repair building, 250 x 300 ft., at air depot, Middletown, Pa.; also bids (no closing date stated) for airplane repair dock, 200 x 250 ft., and accessories; and for pumping station and auxiliary works, same place.

Mack International Motor Truck Corp., Thirty-fourth Street and Forty-eighth Avenue, Long Island City, N. Y., is erecting one-story branch plant at Erie, Pa., for which general contract recently was let to Henry Shenk Co., 1115 Sassafras Street, Erie. Cost over $60,000 with equipment.

Precision Products Co., Corry, Pa., mechanical specialties, has approved plans for one-story plant on Main Stret, 80 x 125 ft., superstructure to begin at once. Cost over $50,000 with equipment. Myers & Johnson, Commerce Building, are architects.

Linde Air Products Co., Inc., 30 East Forty-second Street, New York, has acquired tract at Altoona, Pa., for new branch plant, with storage and distribution facilities. Cost over $100,000.

Coast Guard Store, Treasury Department, Third Avenue and Twenty-ninth Street, Brooklyn, N. Y., closes bids June 9 for 1,084,681 lb. of wrought iron open-link buoy chain, and 58,911 lb. of wrought iron chain bridles for buoys (Circular 2003).

Navy Department, Washington, plans new research station for field service at Leonardtown, Md., supplementing present research laboratory at Bellevue, D. C. Cost about $100,000. Appropriation in that amount has been arranged for building and equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 9 for one 40-ton, heavy-duty diesel engine-powered crawler crane (Schedule 5139).

Bellanca Aircraft Corp., New Castle, Del., has let general contract to W. D. Hallock Construction Co., 804 Orange Street, Wilmington, Del., for one-story addition, 65 x 200 ft. Cost close to $100,000 with equipment. J. Bancroft Peach, Citizens Bank Building, Wilmington, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 12 for electric drills and hammers (Schedule 6973), nippers and pliers (Schedule 7055), clamps and punches (Schedule 6988), motor-driven upright drill (Schedule 7048), motor-driven thread-milling machine (Schedule 7030) for Eastern and Western yards.

The South

• **Wright's Automatic Tobacco Packing Machine Co.,** Calvin and Mangum Streets, Durham, N. C., packing and filling machinery for tobacco plants, road markers, etc., plans one-story addition, about 70 x 400 ft. Cost over $100,000 with equipment.

B. F. Goodrich Co., Akron, Ohio, automobile tires and tubes, etc., has let general contract to Batson-Cook Co., West Point, Ga., for new mill at Louisville, near new steam-electric power plant now in course of construction by Louisville Gas & Electric Co., which will furnish power for mill. It will be equipped for production of a synthetic rubber specialty used for electrical insulation for wiring for submarines, airplanes, etc. Cost close to $1,000,000 with equipment.

City Commission, Jacksonville, Fla., plans expansion and improvements in main municipal electric station, including additional equipment. Cost about $2,000,000. Financing will be arranged in part through Federal aid.

Bureau of Yards and Docks, Navy Department, Washington, plans new one-story repair shops, storehouses, gasoline fueling and tank storage system, piers and other structures at naval base, Jacksonville, Fla. Cost about $875,000. Appropriation in that amount is being arranged.

Georgia Lead Works, Inc., Bishop Street N. W., Atlanta, Ga., has let general contract to Ralph W. Didschuneit, Candler Building, for one-story addition for a refining unit. Cost over $50,000 with equipment.

Board of Education, Lynchburg, Va., has let general contract to W. T. Jones, Lynchburg, for one-story vocational shop at Dunbar high school, at $24,317 exclusive of equipment, which will be purchased under separate contracts.

Phillips Petroleum Co., Philtower Building, Tulsa, Okla., plans new gas recycling plant in West Tuleta gas field, near Beeville, Tex.,

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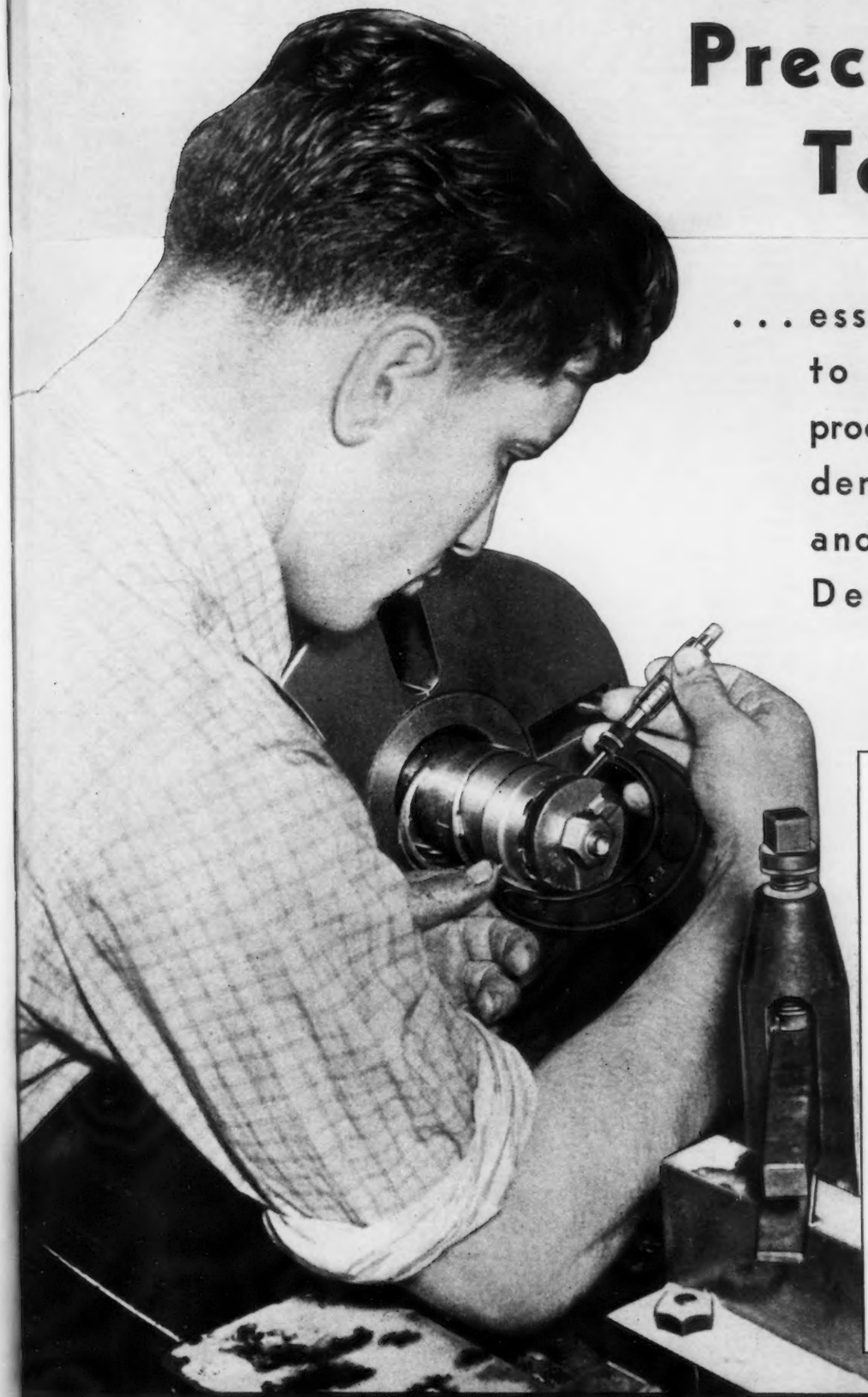

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for natural gasoline production, including compressor station, boiler house, steel tank storage and distribution facilities, and other structures. Cost close to $300,000 with equipment.

Todd Shipbuilding Corp., Galveston, Tex., has let general contract to W. Horace Williams, 833 Howard Avenue, New Orleans, for new dock at shipyard, 37 x 1200 ft., exclusive of equipment, and for extensions in existing dock, 25 x 150 ft. Cost over $125,000 with equipment.

Kessler-Bagnetto Canning Co., Donna, Tex., food canner and packer, has approved plans for new one-story processing and canning plant, about 75 x 160 ft., with boiler house and auxiliary buildings. Cost close to $60,000 with equipment.

Pennsylvania Shipyards, Inc., Beaumont, Tex., has approved plans for new shipbuilding plant for construction of vessels for Maritime Commission, consisting of three shipways, outfitting pier, shops and other structures. Cost about $1,250,000 with equipment. Financing has been arranged through Government.

Central States

● **New York Central Railroad Co.**, Bellefontaine, Ohio, plans addition and improvements to engine house and shops at local yard. Cost close to $100,000 with equipment. Company engineering Department, Paul Hamilton, chief engineer, Big Four Building, 230 East Ninth Street, Cincinnati, is engineer.

National Motor Bearing Co., 1100 Seventy-eighth Avenue, Oakland, Cal., oil and fluid seals, bearings, shims, etc., has let general contract to Hisey-Rebout Co., Van Wert, Ohio, for one-story branch plant, 150 x 350 ft., at Van Wert. Cost over $100,000 with equipment. H. E. Beyster Corp., General Motors Building, Detroit, is architect and engineer.

Firestone Tire & Rubber Co., Inc., Akron, Ohio, has approved plans for one and multi-story plant on local site for production of artificial rubber for Government. Cost about $1,250,000 with machinery. Fund in amount noted will be furnished by Defense Plant Corp., Washington.

Tremco Mfg. Co., Inc., 393 East 131st Street, Cleveland, roofing products, will take bids soon on general contract for new two-story plant at Taft Avenue and East 131st Street, about 50,000 sq. ft. floor space. Cost close to $125,000 with equipment. Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, are architects and engineers.

Parker Appliance Co., 17325 Euclid Avenue, Cleveland, tube couplings, fittings, etc., will begin superstructure soon for new one and two-story plant, 130 x 325 ft., for which general contract recently was let to Austin Co. Cost close to $200,000 with equipment.

American Propeller Corp., recently organized subsidiary of Aviation Mfg. Corp., 420 Lexington Avenue, New York, has let general contract to Austin Co., Cleveland, for new plant at Toledo, Ohio, for production of aircraft propellers for Government. It will comprise a large one-story structure and auxiliary buildings, including an experimental laboratory; present such laboratory of parent company's Lycoming Division, Williamsport, Pa., will be removed to new plant and increased capacity carried out. Cost about $8,700,000 with equipment, fund in that amount to be furnished by Government.

Eli Lilly & Co., Alabama and McCarty Streets, Indianapolis, drugs and chemical products, has let general contract to Leslie Colvin, Board of Trade Building, for four-story and basement addition, 40 x 125 ft., on Merrill Street. Cost close to $100,000 with equipment. Robert F. Daggett, Underwriters' Building, is architect and engineer.

Dart Truck Co., Oak and Twenty-seventh Streets, Kansas City, Mo., has let general contract to Frank Pavlick, 5401 Harrison Street, for one-story addition, 112 x 130 ft. Cost close to $100,000 with equipment. Robert J. Raney, Union Station Building, is architect.

State Board of Regents, State Capitol, Topeka, Kan., plans one-story mineral industries building at University of Kansas, Lawrence, Kan. Cost close to $400,000 with equipment. R. H. Stookey, first noted address, is State architect.

Beech Aircraft Corp., Wichita, Kan., airplanes and parts, plans one-story addition for further expansion for production of aircraft parts for Government. Fund of $446,500 has been secured through RFC for project. Company has had work under way for several months on several additions for similar service.

Sheffield Steel Corp., Sheffield Station, Kansas City, Mo., plans expansion consisting of several one-story units, including equipment, for increased production. Cost about $1,000,000 with machinery.

American Brakeblok Division, American Brake Shoe & Foundry Co., 4600 Merritt Street, Detroit, brake linings and other railway car equipment, has let general contract to Austin Co., Curtis Building, for one-story addition. Cost about $100,000 with equipment. Main offices are at 230 Park Avenue, New York.

F. L. Jacobs Co., 1043 Spruce Street, Detroit, automobile cranks, brake rods and kindred products, plans one-story addition. Cost over $150,000 with equipment.

Square D. Co., Inc., 6060 Rivard Street, Detroit, electric switches and other electrical equipment, has acquired local building, about 75,000 sq. ft. of floor space, for expansion in production division, storage and distributing departments.

Public Works Officer, Ninth Naval District, Great Lakes, Ill., asks bids (no closing date stated) for steam power plant, 40 x 46 ft., paint and oil storehouse, 32 x 82 ft., and other structures at naval reserve aviation base, Detroit (Specification 10274).

Kay-Don Engineering Co., Muskegon, Mich., recently organized, has acquired former one-story building of Austin Machine Co. for production of aircraft parts, bearings for gun mounts and kindred specialties, providing facilities for about 200 employees. Proposed to have works ready for operation in July.

Wallace Supplies Mfg. Co., Inc., 1312 Diversey Parkway, Chicago, bending machines and parts, hydraulic equipment, etc., has asked bids on general contract for one-story addition, 125 x 144 ft., and two-story unit, 30 x 64 ft., for production of aircraft tanks and other aircraft equipment. Cost over $100,000 with machinery. Morton L. Pereira & Associates, 100 West Monroe Street, are architects and engineers.

Acting Purchasing Officer, Indian Service, Department of Interior, Indian Service Warehouse, 615 West Pershing Road, Chicago, asks bids until June 18 for requirements for next fiscal year of tools, barbed wire, valves, cable, wire cloth, chains, nails, scales, oilers, animal shoes, batteries, electrical supplies and other equipment (Schedule 17).

Kohler Co., Kohler, Wis., plumbers' brass goods, sanitary ware, etc., has let general contract to Permanent Construction Co., 2712 North Holton Street, Milwaukee, for five-story addition, 80 x 200 ft., for expansion in brass works. Cost over $150,000 with equipment. Richard Philipp, 756 North Milwaukee Street, Milwaukee, is architect.

Union Pacific Railroad Co., Omaha, Neb., plans rebuilding part of engine and car shops at Cheyenne, Wyo., recently destroyed by fire, including wheel shop, grease reclamation plant and other structures. Loss over $400,000 with equipment.

Allis-Chalmers Mfg. Co., 1126 South Seventieth Street, West Allis, Wis., has asked bids on general contract for two-story addition, 145 x 224 ft., to building No. 7. Cost over $300,000 with equipment.

St. Paul Hydraulic Hoist Co., 2207 University Avenue, S. E., Minneapolis, Minn., hoisting equipment, etc., has let general contract to R. J. Vrooman, 53 West Jackson Boulevard, Chicago, for several one-story additions, 55 x 80 ft., and smaller. Cost about $80,000 with equipment.

Renner & Co., 2400 North Oakley Street, Chicago, metal products, has leased, with option to purchase, a two-story and basement building at 2640-48 North Maplewood Avenue, about 20,000 sq. ft. of floor space, for expansion.

Bureau of Mines, Washington, has awarded general contract to Fred T. Kern Co., Port Washington Road, Milwaukee, for one-story pilot plant for treatment of manganese ores, at Chamberlain, S. D. Cost about $125,000 with equipment.

Western States

● **Columbia Steel Co., Inc.**, 2087 East Slauson Avenue, Vernon, Los Angeles, has let general contract to McNeil Construction Co., 5860 Avalon Boulevard, for one-story addition for storage and distribution. Cost about $100,000 with mechanical-handling and other equipment.

Berkeley Pump Corp., 817 Bancroft Way, Berkeley, Cal., Berkeley, Cal., pumping machinery and parts, has let general contract to W. K. Owen, 1501 Powell Street, for one-story addition, to be used as a machine shop. Cost close to $50,000 with equipment.

Bureau of Reclamation, Denver, asks bids until June 13 for three 100 ft. x 18 ft. drum gates for spillway, Friant Dam, Central Valley project, Cal. (Specification 963).

Doran Co., 63 Horton Street, Seattle, propeller wheels, etc., plans one-story addition, 70 x 100 ft., for a foundry. Cost about $60,000 with equipment. Clare Moffitt, 5622 Eleventh Avenue, N. E., is architect.

Willamette-Hyster Co., Inc., 2902 N. E. Clackamas Avenue, Portland, hoisting equipment, lumber carriers and kindred apparatus, has let general contract to Wegman & Son, Inc., Board of Trade Building, for one-story addition, 70 x 150 ft. Cost about $85,000 with equipment. Richard Sundeleaf, Fenton Building, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 12 for 3000 hacksaw frames (Schedule 6983), folding caliper rules, multiple rules, etc. (Schedule 6986), 5480 spring steel rules, 960 steel measuring tapes, 168 metallic measuring tapes, etc. (Schedule 6985) for Oakland, Cal., yard.

Associated Brewers Co., 519 West Fifteenth Street, Long Beach, Cal., has let general contract to Standard Contracting Corp., 1109 North Vermont Avenue, Los Angeles, for one-story storage and distributing building at 615 West Seventeenth Street, Long Beach, 130 x 142 ft. Cost close to $70,000 with equipment.

Canada

● **Engineering Products of Canada, Ltd.**, 6259 Notre Dame Street, East, Montreal, will take bids soon on general contract for new one-story plant, about 200 x 500 ft., for production of ordnance for Government. Cost over $600,000 with equipment.

Canadian Pratt & Whitney Co., Ltd., Lorne Avenue, Longuel, Que., plans one-story addition for aircraft parts production. Cost close to $100,000 with equipment. W. E. J. Turcotte, 1010 Ste. Catherine Street, West, Montreal, is architect.

Department of National Defense for Air, Ottawa, Ont., will begin work soon on about 25 shops and other buildings, storehouses, etc., at Service Flying Training School, Hagersville, Ont. Cost over $400,000 with equipment.